

CURRICULUM VITAE

SURNAME AND NAME	Tordella Daniela
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Nationality	Italian
Birth date	April 19th 1956

Academic Position

Qualification/Title	Associate Professor
University	Politecnico di Torino
Department	Ingegneria Meccanica ed Aerospaziale
Academic Field (if the candidate holds a position in an Italian University, she/he should insert the "Settore Concorsuale")	09/A1 Ingegneria Aeronautica, Aerospaziale e Navale
Academic Discipline (formally named "Settore Scientifico Disciplinare", only for candidates who hold a position in an Italian University)	Fluidodinamica ING/IND-06

Italian National Scientific Qualifications awarded for Full Professor positions ("Abilitazioni Scientifiche Nazionali di I fascia")

Academic Field ("Settore Concorsuale") 09/A1 Ingegneria Aeronautica, Aerospaziale e Navale

Working experience (please use the following table in order to briefly describe the working positions covered by the candidate)

Dates (from .. to..)	February 1984- July 1986
Name and address of the Employer (Public or/and private institution/body)	Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, I
Position held (for positions in Universities, the candidate should indicate the Faculty/College/School and the Department; in case of Italian Universities the candidate is also requested to indicate the "Settore Scientifico Disciplinare")	Research Associate (formally named Tecnico Laureato), Faculty of Engineering, Department of Aeronautical and Space Engineering DIASP
Main activities/responsibilities	Laboratory research. Innovation of experimental measurement techniques for unsteady and turbulent flow fields (HW-Multi probes, concentration probes, LDV, fast data

	acquisition systems, probe calibration methods and facilities)
Dates (from .. to..)	August 1986 – December 1987
Name and address of the Employer (Public or/and private institution/body)	University of Washington, Seattle, WA 98195 USA
Position held (for positions in Universities, the candidate should indicate the Faculty/College/School and the Department; in case of Italian Universities the candidate is also requested to indicate the "Settore Scientifico Disciplinare")	Fulbright Scholar at the Department of Aeronautics and Astronautics, UW Engineering College. NATO-CNR Advanced Research Fellowships and Fulbright Travel and Research Grant
Main activities/responsibilities	Research on unstable, turbulent and forced sheared mixing layers. Spectral wave analysis and flow visualization.
Dates (from .. to..)	January 1988 –Novembre1989
Name and address of the Employer (Public or/and private institution/body)	Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, I
Position held (for positions in Universities, the candidate should indicate the Faculty/College/School and the Department; in case of Italian Universities the candidate is also requested to indicate the "Settore Scientifico Disciplinare")	Research Associate (formally named Tecnico Laureato), Faculty of Engineering, Department of Aeronautical and Space Engineering DIASP
Main activities/responsibilities	Wake stability under transient and steady regimes. Impulsive and uniformly accelerated transients.
Dates (from .. to..)	November 1989, November 1992
Name and address of the Employer (Public or/and private institution/body)	Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, I
Position held (for positions in Universities, the candidate should indicate the Faculty/College/School and the Department; in case of Italian Universities the candidate is also requested to indicate the "Settore Scientifico Disciplinare")	Assistant Professor, Fluid Dynamics, SSD ING/IND-06 Engineering Faculty, Department of Aeronautical and Space Engineering, DIASP
Main activities/responsibilities	Research on unstable and turbulent sheared mixing layers and wakes. Lectures and academic exercises for the Gasdynamics and Experimental Aerodynamics Courses of the Aerospacial Engineering Program.

Dates (from .. to..)	November 1992 -
Name and address of the Employer (Public or/and private institution/body)	Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, I
Position held (for positions in Universities, the candidate should indicate the Faculty/College/School and the Department; in case of Italian Universities the candidate is also requested to indicate the "Settore Scientifico Disciplinare")	Associate Professor, Fluid Dynamics, SSD ING/IND-06 Faculty of Engineering, Department of Aeronautical and Space Engineering DIASP
Main activities/responsibilities	Hydrodynamics stability and turbulence

	<p>studies for wakes, mixing layer, hypersonic jets, and channel flows. Experimental (laboratory and numerical simulation) and theoretical approach. Teaching of Fluid Dynamics for the Programs of Mechanical Engineering and Mathematics for the Engineering Sciences. Teaching of Turbulent Flows and Numerical Simulation of Turbulent Flows for the Program of Aerospace Engineering. Member of the Scientific Board of the PHD Courses in Fluid Dynamics (since 1994) and Aerospace Engineering (since 2013) of the Politecnico di Torino Doctoral School (SCUDO). Since 2000, scientific responsible for the Aerospace Department Library. Member of the Scientific Advisory Board of the Library System of the Politecnico di Torino (2002-2013).</p>
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Education and Training (please use the following table to describe Degrees awarded, by only indicating the information concerning Bachelor's Degree, Master of Science's Degree or/and PhD)

Date	December 16th 1981
Institution which issued the degree	Politecnico di Torino
Type of Degree awarded (only Bachelor's Degree, Master of Science's Degree, PhD)	Laurea in Ingegneria Aerospaziale, a five years course equivalent to the currentl Laurea Magistrale
Date	June 30th 1983
Institution which issued the degree	von Karman Institute for Fluid Dynamics
Type of Degree awarded (only Bachelor's Degree, Master of Science's Degree, PhD)	Post-Graduate Diploma Course in Fluid Dynamics. Option: Environmental and Applied Fluid Dynamics

1. Scientific Activity. Most important outcomes/results of the research activity

First outcome

Since 1996, I have designed and carried out a joint, experimental and numerical, study of the propagation of hypersonic jets under physical conditions that mimic, in some aspects, the behaviour of protostellar jets. The motivation was to understand whether hypersonic Newtonian jets produce any similarity to the morphologies observed in jets from young stellar objects (YSOs) and whether numerical codes, based on Godunov-type schemes, capture the basic physics of shocked flows. The Earth laboratory experiment was based on a low energy facility designed to produce and observe near isentropic hypersonic gas jets. It was demonstrated that these jets propagate maintaining their collimation over long distances, in units of the jet initial radius. The jets studied are quasi-isentropic, are both lighter and heavier than the ambient and meet the two main scaling parameter requirements for proto-stellar jets: the ejection Mach number and the ambient/jet density ratio. Performed Newtonian three-dimensional numerical simulations reproduced the mid-to-long-term evolution of the hypersonic jets observed in the laboratory. Within experimental errors, the results of numerical simulations agree with the data collected in the laboratory that concern the global morphologies, the jet head advance speed, the formation and structure of knots and the jet final fate. The experiment has

highlighted the following aspects that are common to protostellar jets: (i) the near-isoentropic jets remain confined over distances much larger than the initial radius; and (ii) the presence of a cocoon surrounding the light jet, whereas this is not visible for the overdense one. These are therefore properties of high-Mach-number Newtonian jets, which capture some features of the morphology of astrophysical jets with hypersonic jet experiments produced in an Earth laboratory and in numerical simulations. These results confirm that hypersonic jets can propagate over long distances without external confining mechanisms, e.g. magnetic fields.

The main product of this research work is a paper published in New Journal of Physics (IOP Science) in 2011 (**New J. Phys. 13 043011**). This Journal is an Open Access high Impact Factor Journal (IF 4.177 in 2011) that publishes across the whole of physics, encompassing pure, applied, theoretical and experimental research, as well as interdisciplinary topics where physics forms the central theme, see P1 of the uploaded research products. Before publication, an embargo was placed on the article. This has resulted in some press releases: by ANSA in Rome, by the Institute of Physics in London, by the Cosmos Magazine in Sidney, AU, and others, <http://areeweb.polito.it/ricerca/philofluid/news-events.html>. This paper also gained a place in the NJP highlight 2011 since downloaded 1600 times in the first 10 months, 500 in the first week of issuing. By now the article was viewed more than 4000 times and downloaded 2175 times. The supplemental material contains three movies. Under request by IOP, a Video Abstract was sponsored by the administration of the Politecnico di Torino (<http://iopscience.iop.org/1367-2630/13/4/043011?fromSearchPage=true>, the video abstract was viewed 423 times).

Group of researchers participating to this study. The activity started in 1996 by conceiving a low energy experimental facility to produce and observe hypersonic gas jets. Since I could not find hospitality in any of the Politecnico di Torino laboratories, I looked elsewhere. At the Politecnico di Milano, Professors Amalia Finzi and Vittorio Giavotto, gave me the opportunity to use the vacuum chamber used to study the Italian-CNR tethered satellite. I started then together with Sergio De Ponte the design of the hypersonic jet facility, which afterwards in between 1997-2007 was funded with a series of CNR, ASI, and PRIN-MIUR grants. This allowed to commission to the mechanical workshop at CERN-Geneva of 4 high quality De Laval nozzles (Mach 5, 10, 15 and 20). The group was joined in 1999 by Marco Belan (POLIMI) and in 2001 by two astrophysicist of the University of Turin (UNITO), Prof. Attilio Ferrari and Prof. Silvano Massaglia. In 2009, another UNITO astrophysicist, Dr. Andrea Mignone and the director of the Max Planck Institute for Dynamics and Self-Organization, Prof. Eberhard Bodensatz, joined the research activity.

Other significant papers appeared in the New Journal of Physics (paper just issued on August 7, 2014), in Astronomy and Astrophysics 2013, in Astrophysics and Space Science 2011, 2004, in Physical Review E 2010 (paper that gained visibility on the journal main portal page, see the page <http://pre.aps.org/kaleidoscope/August2010>), and in Experiments in Fluids 2008.

Follow up. In the last years I succeeded in enlarging the collaboration to Dr. J Richardson (PI of the NASA Voyager, The Interstellar Mission, for the section Plasma Physics) and Prof. JW Belcher (both of the MIT Kavli Institute for Astrophysics and Space Research) and to Prof. M. Opher (Boston University). We intend to propose an update of the present experiment to create a supersonic plasma jet (simulating solar wind) that will flow past a spherical body with a dipole magnetic field. A portion of the jet will be ionized using a downstream glow discharge and will be magnetized using an externally imposed magnetic field. The spherical body represents the planetary magnetosphere. The resulting interaction between the ionized portion of the jet and the dipole field will be imaged. Parameters (Mach number, plasma beta, and inclination of the plasma magnetic field lines in the flow to the dipole of the spherical body) will be systematically varied in the experiment to develop a better understanding of the asymmetry observed by Voyager 1 and 2 in the processes occurring at the boundary of the planetary magnetosphere. The experimental results will be compared with the predictions of a numerical MHD code (PLUTO).

At the moment the group is active in a statistical and spectral analysis of the solar wind and magnetic fields data from Voyager 2 (year 1979, and period 2007-2013).

Editorial activity. At the moment I am guest Editor of the NJP Special Focus Issue on Astrophysical Jets, co-editors P. Bellan (Caltech), T. Ray (Dublin Institute of Advanced Studies) and A. Ferrari (UNITO).

Second outcome.

Context: the physics of turbulence, in particular turbulent diffusion and intermittency in simple inhomogeneous systems as the shear-free turbulent mixing. This subject is linked to one fundamental question: are the small scales in turbulence universal? If so, under which conditions? What is their connection to the large scale motion? The basis for the near-universal behavior of small scales is provided by Kolmogorov's theory (1941 and 1962). But the gaps in this theory are becoming increasingly certain. A manifestation of the non-universal behavior of small-scales is closely related to small-scale anisotropy.

In this work, **Physical Review Letters 107, 194501 (Nov.2011)**, the generation of small-scale anisotropy in turbulent shearless mixing was numerically investigated. Data from direct numerical simulations at Taylor Reynolds' numbers between 45 and 150 show not only that there is a significant departure of the longitudinal velocity derivative moments from the values found in homogeneous and isotropic turbulence but that the variation of skewness has an opposite sign for the components across the mixing layer and parallel to it. The anisotropy induced by the presence of a kinetic energy gradient has a very different pattern from the one generated by an homogeneous shear. The transversal derivative moments in the mixing are in fact found to be very small, which highlights that smallness of the transversal moments is not a sufficient condition for isotropy.

Method and group. In 1999, with Michele Iovieno, at the time a first year phd student, I started from scratch to work on the preparation of Navier Stokes spectral and hybrid spectral-finite difference codes for Direct and Large Eddy Numerical Simulations. Since 2001, the codes runs on the machines of the principal European Centers of Supercalculus (BSC-Mare Nostrum Barcelona, GENCI/CEA-Curie Paris, CINECA- CrayT3E - SGI Origin 3800, IBM Sp3, Sp4, SP6, IBM BlueGene/Q FERMI, NEC SX-8 HLRS Stuttgart, Cluster Matrix CASPUR). The codes at the moment can be freely downloaded <http://areeweb.polito.it/ricerca/philofluid/software.html> The group recently was joined by Dr. Lauris Ducasse, and two phd students Silvio Di Savino and Luca Gallana. Moreover, in the last months, we also started to collaborate with the group of A. Liberzon (Tel Aviv University).

Related papers appeared in Computer Physics Communication, 2001, in the Journal of Fluid Mechanics, 2006, in Physical Review E, 2008 and 2013, in Physica D Nonlinear Phenomena, 2012 and 2014, in the Journal of Turbulence, 2014.

Follow up. January 2014, selection by the High-Performance Computing European Partnership PRACE <http://www.prace-ri.eu/> as a success story to be included in the PRACE Annual Report 2013. A few press releases followed, in particular worthy of note is the press release appeared in the French Bulletins-Electroniques du Ministere des Affaires Etrangeres, <http://www.bulletins-electroniques.com/actualites/76302.htm>.

In connection with this research activity, in April 2014, I could submit as coordinator a proposal for an Innovative Training Networks (ITN) H2020-MSCA-ITN-2014 on cloud microphysics called CLOUD-MicroPhysics-Turbulence-Telemetry. The Network includes groups of the Imperial College London, the Max Planck Institute, the University of Warsaw and the Tel Aviv University; German, Israeli, Polish and Italian small and medium enterprises, and sees as participants two German and Italian governmental regional institutions and the incubators of the Tel Aviv University and the Politecnico di Torino.

In 2009, after submission of a proposal to the European Mechanics Society, I have organized and co-chaired with K.R.Sreenivasan, a Euromech Colloquium dedicated to [Akiva Yaglom and Robert Kraichnan](#) on Small Scale Turbulence and Related Gradient Statistics <http://www.euromech512.polito.it/>.

Editorial activity: in 2011-2, together with K.R. Sreenivasan (NYU, Courant Institute) I edited the PhysicaD Nonlinear Phenomena Special Issue on Small Scale in Turbulence, see preface at <http://www.sciencedirect.com/science/journal/01672789/241/3>

Third outcome.

Product. Large-eddy simulation of hypersonic flows. Selective procedure to activate the sub-grid model wherever small scale turbulence is present. Original Research Article. Computer Physics Communications, Volume 184, Issue 12, December 2013, Pages 2651-2661.

A new method for the localization of the regions where small scale turbulent fluctuations are present in hypersonic flows is applied to the large-eddy simulation (LES) of a compressible turbulent jets. The localization method used is called selective LES and is based on the exploitation of a scalar probe function f which represents the magnitude of the stretching–tilting term of the vorticity equation normalized with the enstrophy (Tordella et al., CPC 2007, PHYSD2014). For a fully developed turbulent field of fluctuations, statistical analysis shows that the probability that f is larger than 2 is very low, and, for any given threshold, it is larger if the flow is under-resolved. By computing the spatial field of the probe function f in each instantaneous realization of the simulation it is possible to locate the regions where the magnitude of the normalized vortical stretching–tilting is anomalously high. The sub-grid model is then introduced into the governing equations in such regions only. The results of the selective LES simulation are compared with those of a standard LES, where the sub-grid terms are used in the whole domain, and with those of a standard Euler simulation with the same resolution. The comparison is carried out by assuming as reference field a higher resolution Euler simulation of the same jet. It is shown that the selective LES modifies the dynamic properties of the flow to a lesser extent with respect to the classical LES. In particular, the prediction of the enstrophy, mean velocity and density distributions and of the energy and density spectra are substantially improved. The article supplemental material includes three dimensional visualization movies: animation of a passive tracer introduced in the perturbed round jet at $t=0$, time evolution of the regions where subgrid terms are introduced in the selective LES simulation and unsteady iso-contours of the probe function probability.

Related papers on the Large Eddy Simulation Methodology and application appeared in Physics of Fluids (2002, 2003, 2004), Computer Physics Communication (2007, 2008), PhysicaD 2014.

Antecedent activity and applications. The proposal of subgrid scale models and procedures in the context of Large Eddy Simulation (LES) started while tutoring the PHD of Michele Iovieno and is based on the attempt to overcome intrinsic physical limitations of the LES methodology. For example, different types of instantaneous wall boundary conditions have been proposed for resolved large scale simulations that extend inside the viscous sublayer (POF 2004). These conditions transfer the physical no-slip and impermeability/permeability information, which can only be rigorously applied to the unfiltered variables, to the filtered variables. Another proposed procedure (POF 2003) approximates the noncommutation terms that arise whenever it is necessary to use a variable scale filtering of the motion equations. Such a situation usually concerns large eddy simulation of nonhomogeneous turbulent flows present in most engineering (aeronautical and automotive contexts), atmospheric, geophysical and astrophysical applications. The noncommutation of the average and differentiation operations leads to nonhomogeneous terms in the motion equations, that act as source terms of intensity which depend on the gradient of the filter scale and, if neglected, induce a systematic error throughout the solution. A file rouge inside this activity on the LES methods is the exploitation of the information that locally we can obtain from the vorticity and vortical stretching-tilting flow fields (CPC 2007, 2008 and PhysD2014).

Related to my LES activity is my quite intense referee service for two Journals in particular: Physics of Fluids and Physical Review E.

Technology transfer activity related to LES was carried out in the last ten years for Alenia Aeronautica in Turin and the CD-Adapco software development office in London. Based on this experience, I have organized since 2012 in my group website a software section dedicated to the sharing of the in-house software produced in my group, see <http://areeweb.polito.it/ricerca/philofluid/software.html>.

Since 2007, an academic exchange finalized to the exchange of newly developed software has been established with the chair of Fluid Dynamics in the Technische Universität Darmstadt (*Fachgebiet Strömungsdynamik*) held by Martin Oberlack. See, Tilte 11.

1.1 Other selected publications

1 M Belan, D Tordella, S De Ponte, A Mignone and S Massaglia, Hypersonic jets in astrophysical conditions: focus on spreading and asymmetric stability properties, NEW JOURNAL OF PHYSICS, Institute of Physics, pp.12, 2014, Vol. **16** 085002, ISSN: 1367-2630, DOI:10.1088/1367-2630/16/8/085002

- 2 D. Tordella, S. Di Savino, L. Sitzia, Large fluctuations of the nonlinearities in isotropic turbulence. Anisotropic filtering analysis, *PHYSICA D-NONLINEAR PHENOMENA*, Elsevier, pp. 11, 2014, Vol. 284, ISSN: 0167-2789, DOI: 10.1016/j.physd.2014.05.001
- 3 M. Iovieno, S. Di Savino, L. Gallana, D. Tordella, Mixing of a passive scalar across a thin shearless layer: Concentration of intermittency on the sides of the turbulent interface, *JOURNAL OF TURBULENCE*, Taylor & Francis, pp. 24, 2014, Vol. 15, ISSN: 1468-5248, DOI: 10.1080/14685248.2014.905393
- 4 M. Belan, S. Massaglia, D. Tordella, M. Mirzaei, S. de Ponte, The Hydrodynamics of Astrophysical jets: Scaled Experiments and Numerical Simulations, *ASTRONOMY & ASTROPHYSICS*, EDP Sciences, pp. 9, 2013, Vol. 554, ISSN: 0004-6361, DOI: <http://dx.doi.org/10.1051/0004-6361/201321040>
- 5 Bailey P., Abba' A., Tordella D., Pressure and kinetic energy transport across the cavity mouth in resonating cavities, *PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS*, APS The American Physical Society, pp. 11, 2013, Vol. Phys. Rev. E 87, 013013, ISSN: 1539-3755, DOI: 10.1103/PhysRevE.87.013013
- 6 Tordella D., Iovieno M., Decaying turbulence: what happens when the correlation length varies spatially in two adjacent zones, *PHYSICA D-NONLINEAR PHENOMENA*, Elsevier, pp. 8, 2012, Vol. 241, ISSN: 0167-2789, DOI: 10.1016/j.physd.2011.09.001
- 7 MARCO BELAN; ; SERGIO DE PONTE; TORDELLA D.; SILVANO MASSAGLIA; ANDREA MIGNONE; Bodenschatz E.; ATTILIO FERRARI, Hydrodynamics of Hypersonic Jets: Experiments and Numerical Simulations., *ASTROPHYSICS AND SPACE SCIENCE*, Springer, pp. 6, 2011, Vol. 336, ISSN: 0004-640X, DOI: 10.1007/s10509-011-0600-6
- 8 BELAN M; DE PONTE S; TORDELLA D., Highly underexpanded jets in the presence of a density jump between an ambient gas and a jet, *PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS*, American Physical Society, pp. 10, 2010, Vol. 82, ISSN: 1539-3755, DOI: 10.1103/PhysRevE.82.026303
- 9 SCARSOGLIO S; TORDELLA D.; CRIMINALE W.O, The role of long waves in the stability of the plane wake, *PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS*, pp. 9, 2010, Vol. 81, ISSN: 1539-3755, DOI: 10.1103/PhysRevE.81.036326
- 10 SCARSOGLIO S; TORDELLA D.; CRIMINALE W.O, An exploratory analysis of the transient and long-term behavior of small three-dimensional perturbations in the circular cylinder wake, *STUDIES IN APPLIED MATHEMATICS*, Massachusetts Institute of Technology, pp. 21, 2009, Vol. 123, ISSN: 0022-2526, DOI: 10.1111/J.1467-9590.2009.00449.X
- 11 BELAN M; DE PONTE S; TORDELLA D., Determination of density and concentration from fluorescent images of a gas flow, *EXPERIMENTS IN FLUIDS*, 2008, Vol. 45, ISSN: 0723-4864, DOI: 10.1007/s00348-008-0493-5
- 12 TORDELLA D.; MICHELE IOVIENO; PETER ROGER BAILEY, Sufficient condition for Gaussian departure in turbulence, *PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS*, The American Physical Society, pp. 10, 2008, Vol. 77, ISSN: 1539-3755, DOI: 10.1103/PHYSREVE.77.016309
- 13 TORDELLA D; IOVIENO M.; MASSAGLIA S, Small scale localization in turbulent flows. A priori tests applied to a possible Large eddy Simulation of compressible turbulent flows, *COMPUTER PHYSICS COMMUNICATIONS*, Elsevier, pp. 11, 2007, Vol. 176, ISSN: 0010-4655, DOI: 10.1016/j.cpc.2006.12.004
- 14 TORDELLA D.; S.SCARSOGLIO; M.BELAN, A synthetic perturbative hypothesis for the multiscale analysis of the wake instability, *PHYSICS OF FLUIDS*, AIP, pp. 10, 2006, Vol. 18, ISSN: 1070-6631, DOI: 10.1063/1.2201114
- 15 BELAN M; TORDELLA D., Convective instability in wake intermediate asymptotics, *JOURNAL OF FLUID MECHANICS*, 2006, Vol. 552, ISSN: 0022-1120, DOI: 10.1017/S0022112006008627

16 TORDELLA D.; IOVIENO M, Numerical experiments on the intermediate asymptotics of shear-free turbulent transport and diffusion, JOURNAL OF FLUID MECHANICS, Cambridge University Press, pp. 13, 2006, Vol. 549, ISSN: 0022-1120, DOI: 10.1017/S0022112005007688

17 M. IOVIENO; G. PASSONI; TORDELLA D., A new large-eddy simulation near-wall treatment, PHYSICS OF FLUIDS, AIP American Institute of Physics, pp. 10, 2004, Vol. 16, ISSN: 1070-6631, DOI: 10.1063/1.1783371

18 TORDELLA D.; M. BELAN, A new matched asymptotic expansion for the intermediate and far flow behind a finite body, PHYSICS OF FLUIDS, AIP, pp. 10, 2003, Vol. 15, ISSN: 1070-6631, DOI: 10.1063/1.1580482

19 M.IOVIENO; TORDELLA D., Variable scale filtered Navier-Stokes Equations. A new procedure to deal with the associated commutation error, PHYSICS OF FLUIDS, American Institute of Physics, pp. 11, 2003, Vol. 15, ISSN: 1070-6631, DOI: 10.1063/1.1577345

20 M.IOVIENO; C.CAVAZZONI; TORDELLA D., A new technique for a parallel dealiased pseudospectral Navier-Stokes code, Comp. Phys. Comm., COMPUTER PHYSICS COMMUNICATIONS, 2001, Vol. 141, ISSN: 0010-4655

2-3-5-6-12-16-17-19-20 – Homogeneous turbulence: difference of the physical velocity fluctuation field with respect to the Kolmogorov turbulence, demonstration in term of vortical stretching-tilting statistics. Nonhomogeneous turbulence: - sufficient condition for Gaussian departure in turbulence - turbulent mixing anisotropy of the small scales, existence of two high intermittency regions aside thin layers across which a passive scalar transport takes place, LES method: - new wall boundary conditions that account for the necessary variation of the filtering scale close to the wall, - new method to treat explicitly the non commutation terms which arise in the filtered equations when the filtering scale varies due to high inhomogeneity of the mean flow.

1-4-7-8-11-13 – Earth laboratory experiments on hypersonic jets in astrophysical partial similitude (Mach and jet/ambient density ratio) and new numerical large eddy simulation method based on the detection of the presence of the small turbulent scales by means of information linked to the local vortical stretching-tilting. The laboratory experiment has produced the first case of laboratory collimated hypersonic jet over long distances (about 100 jet formation scales). The new LES method allows a net improvement of the spectral representation and enstrophy prediction of the hypersonic jets.

9-10-14-15-18 - Linear stability of shear flows. Modal multiscale analysis (JFM 2006, PoF2006). Non modal approach based on the initial value problem associated to perturbative governing equations written in the vorticity-velocity formulation (QAM 1995, SAM 2009, PoF 2003). Role of long waves (PRE 2010). Collective behaviour of three-dimensional perturbative waves. Most part of the work was carried out on plane wakes. Recently, I started to study also the plane channel and Couette flows and the boundary layer in cross flow. The perturbation analysis is associated to the determination of Navier-Stokes approximate solutions of the basic flow via asymptotic expansions (new criteria for the matching of asymptotic expansion solutions of the inner and outer flows, temporal and spatial multiscaling. This research activity initiated in 1995 with a paper on Quarterly of Applied Mathematics and then pursued in collaboration with Marco Belan, and now with Stefania Scarsoglio. International collaborations with W.O.Criminale, University of Washington and G. Staffilani, MIT.

I designed, discussed, selected the results and written all the papers I have authored.

I have been the corresponding author for all the papers I authored with the exclusion of ZAMM 1997, A&A 2013 and NJP 2014.

Globally, my literature production consist of 41 journal papers, 1 in revision, 5 in preparation, 3 editorials, about 80 Conference Proceedings (ETC, IFIP, AFMC, DLES, EuroMech Colloquia, BIFM, EPFDC, DSFD) and Conference Abstracts (EFMC and APS DFD Bulletins) , 2 databases (Navier-Sokes shearless turbulent fields and collection hydrodynamic stable and unstable travelling waves in sheared flows), 28 technical and departmental reports.

For the 23 papers here presented (3 as principal research outcomes and 20 as submitted publications, the Impact Factor ranges from 1.525 (Studies in Applied Mathematics, MIT publishing) to 7.37 (Physical

Review Letters). For these 23 papers the average IF is 2.3.

1.2 Complete list of all the significant publications of the candidate, including those listed at points 1.1 and 1.2.

The complete list is included at the end of the document.

2. Coordination of research and projects.

Doctoral and Post-Doctoral Students Supervision

-- PHD students

1. *M. Belan (1996-2000) Weakly nonlinear dispersive wave packets. Application to the wake of the bluff body (now assistant professor at Politecnico di Milano)*
2. *M. Iovieno (1999-2002) Angular momentum application in Fluid Dynamics (now assistant professor at Politecnico di Torino)*
3. *S. Scarsoglio (2005-2008) Instability of nonparallel flows*
4. *P. Bailey, UK (2006-2009) Velocity-pressure correlation in turbulent recirculating wall flows*
5. *Francesca De Santi, I (2010--) Instability in shear and stably stratified flows*
6. *Silvio di Savino, I (2010--2014), Small-scale turbulence*
7. *Luca Gallana, I (2013--) Stratified turbulence, passive scalar turbulent transport*
8. *Federico Fraternali, I (2014--) Weak turbulence, Voyager 2 solar wind data analysis*

--Post-Doctoral fellows. Politecnico di Torino grants.

Marco Belan 2001, Michele Iovieno 2003-2004, Stefania Scarsoglio (2008), Lauris Ducasse (2010, 2011).

--Post-Graduate Research Grants

- *A. Zito (October 2006-Jan 2007) on a new POLITO Immersed Boundary Navier Stokes code (Polito IB-NS cfd code), Grant Regione Piemonte E60 2004*
- *M. Giordanello (Jan 2007 - April 2007) FV Computational Mesh for the study of the flow about a finite wing, Grant Regione Piemonte E59 2004*
- *C. Tribuzi (Jan 2007-Jan 2008) LES and DNS using the new POLITO IB-NS cfd code, use of STAR-CCM+ cfd code for RANS simulations about finite flat and curved wings, Grant Regione Piemonte E59 2004*
- *M. Novara (June 2007-May 2009) LES and DNS using the new POLITO IB-NS cfd code, parallelization of the code at CINECA-Bologna, Grant Regione Piemonte E60 2004*

National and International Collaborations

- *Politecnico di Torino, DENER (D. Grasso, D. Borgogno)*
- *Politecnico di Milano (M. Belan, A. Abba', G. Passoni, S. De Ponte)*
- *Universita' di Torino (S. Massaglia, A. Ferrari, A. Mignone)*
- *University of Warwick, Coventry, UK (Prof. Robert Kerr)*
- *MIT, Kavli Institute for Astrophysics and Space Research (J. Richardson, J.W. Belcher)*
- *University of Tel Aviv, Dept. of Mechanical Engineering (A. Liberzon)*
- *ISAC CNR Torino (Jost Von Hardenberg)*
- *Max Planck Institute for Dynamics and Self-Organization Goettingen (E. Bodenschatz)*
- *Weierstrass Institute fur Angewandte Analysis und Stokastik, Berlin (S. Proessdorf)*
- *University of Washington (J. Riley, R.E. Breidenthal, W.H. Christiansen, W.O. Criminale,)*
- *MIT, Cambridge, Massachusetts, USA (G. Staffilani, Department of Mathematics)*
- *Darmstadt University, Group of Fluid Dynamics (G. Khujadze, M. Oberlack)*
- *Cineca, Casalecchio di Reno, Italy (C. Cavazzoni, M. Cestari, High Performance Systems Department)*
- *Institut Non Lineaire de Nice, Nice, France, L. Ducasse*
- *International Collaboration for Turbulence Research, ICTR www.ictr.eu*
- *JETSOT, Joint Experiments Theory and Simulation on Turbulence, Politecnico di Torino, Politecnico di Milano, Univarsita' di Torino.*
- *CMSO, Center for Magnetic Self Organization, USA*

- *Partecipation to JETSET, JET Simulations, Experiments and Theories, Marie Curie Research Training Network, Coordinator Thibaut Lery - lery@cp.dias.ie Cosmogrid - Dublin Institute for Advanced Studies, 2005-2008.*

- *Coordinator with M.Onorato for the Politecnico di Torino of the AeroTraNet -Marie Curie Research Training Network, 2006-2009 (AeroTraNet, Marie Curie Actions, Host Fellowships EST). Network: University of Leicester (A. Rona), INP de Toulouse (C. Airiau), Universita' degli Studi Roma Tre (G. Guj and R.Camussi).*

Academic Exchanges (participation, organization and action as contact point)

Proponent and responsible for the biennium 2007-2008 of the Cooperation Agreement between the POLITECNICO di TORINO and the POLITECNICO di MILANO for joint research in the field of turbulence dynamics and exchange of faculty and students for study and research. The cooperation program is called Joint Experiments Theory Simulations on Turbulence (JETSOT). Signed by the Rectors F.Profumo and G. Ballio in Milano on May 31, 2006.

Cooperation agreements between Politecnico di Torino and Politecnico di Milano for the study of turbulence (JETSOT: Joint Experiments - Theory -Simulations on Turbulence), signed by F.Profumo (PoliTO) and G.Ballio (PoliMI), referent D.Tordella, see Titles 13 and 14.

Cooperation agreement between Università di Torino (Dip.Fisica Generale), Politecnico di Torino (Dip.Ing.Aeronautica e Spaziale) and Osservatorio Astronomico di Torino, signed by L.Ferrero (UniTO), M.Di Sciuva (PoliTO), E.Trussoni (Oss.TO), referent D. Tordella, see Titles 16 and 17.

Participants:

UniTO: Ferrati, Massaglia, Zanni

PoliTO: Tordella, Porcelli, Iovieno

PoliMI: De Ponte, Belan

Oss.TO: Trussoni, Bodo, Rossi, Mignone, Murante

Contact person for the Italian engineering part of the Academic Exchange between CMSO in USA and JETS in Italy. The Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas (CMSO, established by NSF in september 2003) includes scientists of the University of Wisconsin, the University of Chicago, the Princeton University, the Science Intenational Corporation, the Swarthmore College and the Laurence Livermore National (S.Prager, R. Rosner).

Academic exchange agreement CMSO - JETSOT, signed by S.Prager (CMSO), A.Ferrari (Jetsot), D.Tordella referent for the Italian engineering part, see Title 18.

Agreement for cultural, educational and scientific cooperation, between The University of Washington and the JETSOT Program, signed by M.O'Donnel (UW), C.Naldi (PoliTO), G.Spinelli (PoliMI), D. Tordella referent for the Politecnico di Torino, see Title 15.

General agreement between The University of Washington and the Politecnico di Torino within the framework of Internalization Program of the Italian Ministry of University and Research, signed by C.Naldi (PoliTO), K.K.Tung, A.Bruckner (UW).

Referents: W.O.Criminale, R.E.Breidenthal (UW), D.Tordella (PoliTO), see Title 12.

Since November 2007 Member of ICTR International Collaboration for Turbulence Research.

<http://www.ictr.eu>.

Asked to set out an Agreement between the POLITECNICO di TORINO and the UNIVERSITY of DARMSTADT on the exchange of the Spectral Code for Incompressible Navier-Stokes equations, authored by D.Tordella and M.Iovieno. The Politecnico di Torino remains the sole owner of the software, the University Darmstadt is responsible for using the software for research and development purposed only. Reference persons: Prof. D.Tordella, Politecnico di Torino, Prof. M.Oberlack, Technische Univeristat Darmstadt. Signed February 2007, see Title 11.

- **Competitive National and International research projects, awarded through a peer-review process.**

Project and Research Sponsors

--- *MISTI_ Global Seeds Funds, MIT- Joint proposal with Turin Politecnico; Italy: Laboratory Simulation Of Planet-Solar Wind And Interstellar Medium/Heliosphere Interactions*
 proponents Daniela Tordella, Politecnico di Torino DIASP, and J.Richardson and JW Belcher, MIT Kavli Institute for Astrophysics and Space Research, 2014 -2015.

--- *PRACE B award, 1 Nov 2013, Project name: Performance improvement of an hybrid OpenMP/MPI code for the solution of the Navier-Stokes equations by using new libraries and a different domain Decomposition, Proposal n°2010PA1708, CINECA Fermi and GENCI/CEA Curie Thin nodes.*

--- *Tier-0 PRACE award, April 2012, "Fluid turbulence: self and passive scalar diffusion. Application to stably stratified flows" (<http://www.prace-ri.eu/PRACE-4th-Regular-Call>), Curie GENCI-CEA, The amount of resources allocated is 2.440.500 core hours in CURIE FN (GENCI@CEA, Paris, France) and 536.850 core hours in CURIE TN (GENCI@CEA, Paris, France).*

--- *Invitation to The Nature of Turbulence, UC Santa Barbara, Kavli Institute for Theoretical Physics, KITP, Coordinators: Eberhard Bodenschatz, Gregory Falkovich, Susan Kurien, Katepalli Sreenivasan, February 7, 2011 - June 3, 2011, <http://www.kitp.ucsb.edu/activities>.*

--- *PROGETTO LAGRANGE-FONDAZIONE CRT (award for one PHD fellowships <http://www.progettolagrange.it/it/>, on the subject "To what extent spectra of turbulent flows are linked to the nonlinear interaction among their different modes?"*

--- *MISTI_ Global Seeds Funds, MIT- Joint proposal with Turin Politecnico; Italy: Long term interaction in flow systems, proponents Daniela Tordella, Politecnico di Torino DIASP, and G.Staffilani, MIT Department of Mathematics, 2010 - 2012.*

--- *ISCRA Projects: first 2010 Call for Proposals Italian Super Computing Resource Allocation <http://hpc-iscra.cineca.it/Call1-results.html> Type A, PI TORDELLA Daniela, Politecnico di Torino (collaborators IOVIENO Michele, ABBA' Antonella, SCARSOGLIO Stefania, DE SANTI Francesca, DUCASSE Lauris) Turbulent mixing and diffusion, Budget: 300000 CPU hours (maximum request of resources allocated).*

--- *Proponent and chair-person of the Euromech Colloquium 512 Small Scale Turbulence and Gradient Statistics, Turin October 26 - 29, 2009.*

--- *European Mechanics Society, Politecnico di Torino, Accademia delle Scienze di Torino, ICTP International center for Theoretical Physics in Trieste, CIFS Consorzio Interuniversitario di Fisica spaziale, CINECA Consorzio Universitario, IBM Italia <http://www.euromech512.polito.it>*

Chairpersons:

-Daniela Tordella, Politecnico di Torino, Dipartimento di Ingegneria Aeronautica e Spaziale (DIASP) ,
 -Katepalli R. Sreenivasan, the Abdus Salam International Centre for Theoretical Physics

Scientific Committee, see http://www.euromech512.polito.it/scientific_committee

--- *Joint Projects for the exchange of researchers within the Executive Programme Italy-Japan, Politecnico di Torino, DIASP Nagoya Institute of Technology, Dinamica di scalari passivi in turbolenza disomogenea ed anisotropa, coordinators: Daniela Tordella and Toshiyuki Gotoh (under review).*

-- *Coordination with M.Onorato for the il Politecnico di Torino of AEROTRANET, Human Resources and Mobility (HRM) Activity, MARIE CURIE ACTIONS, Host fellowships for Early Stage Research Training (EST), 2006-2010.*

-- *Coordinato of Progetto Regione Piemonte E60, 2006-2011, Metodi instazionari innovativi per la simulazione dei flussi turbolenti su superfici di velivoli*

-- Participation to Progetto Regione Piemonte E59, 2006-2010, Nuovi concetti e tecnologie per lo sviluppo di velivoli ultraleggeri innovative

-- HPC-Europe HLRS Stuttgart, grant 2007

-- HPC-Europe BSC Barcellona, grants 2005, 2006

-- Participation to JETSET, JET Simulations, Experiments and Theories, Marie Curie Research Training Network, Coordinator Thibaut Lery - lery@cp.dias.ie Cosmogrid - Dublin Institute for Advanced Studies, 2005-2008.

-- PRIN 2005-2007, coordinator of the engineering unit of research, Evoluzione di medio-lungo termine dei getti ipersonici: visualizzazione, misure di densità e concentrazione, simulazioni numeriche.

Applicazioni

ai getti interstellari. Area Scientifico Disciplinare 02: Scienze fisiche 50% (Università di Torino), Area Scientifico Disciplinare 09: Ingegneria industriale e dell'informazione 50% (Politecnico di Torino and Politecnico di Milano).

-- Participation I Network per la Fluidodinamica Computazionale assistita dal Calcolo ad Alte Prestazioni, costituito al CINECA nel 2004.

-- COFIN 2002, responsabile di unità di ricerca, progetto Simulazioni numeriche e di laboratorio di getti ipersonici. Settori scientifico-disciplinari interessati dal Programma di Ricerca: FIS/05 - ASTRONOMIA E ASTROFISICA, ING-IND/06 – FLUIDODINAMICA.

-- CINECA, Dipartimento Calcolo ad Alte Prestazioni, CPU Resources Grant 1627S, 2000-2001, Evoluzione ed interazione del sistema di urti e delle strutture turbolente di larga scala nei getti ipersonici. Simulazioni numeriche e loro confronto con simulazioni di laboratorio.

-- ASI, Agenzia Spaziale Italiana, Fundamental Research, 1999-2000, 2001-2002, coordinator of the engineering part of the Project Hypersonic Jets, laboratory and numerical simulations. Gasdynamical and Astrophysical Applications.

-- COFIN 1999-2000: Simulazione Sperimentale di Getti Ipersonici, applicazioni astrofisiche. Progetto Plasmastrofisici, Cofinanziamento MURST di Astrofisica e Fisica Cosmica.

-- 1997-1999, coordinator of the Project ASNESGI, Consiglio Nazionale delle Ricerche, Analisi sperimentale e numerica dell'evoluzione spaziale di getti ipersonici (Experimental and numerical analysis of the intermediate-long term evolution of hypersonic jets).

- **Outcomes obtained in the field of technology transfer, in terms of participation in start-ups and spin-offs, development, use and commercialization of patents/licenses.**

Collaboration with the Politecnico di Torino Spin Off ENVISENS Technologies (G.Perona and M.Allegretti, <http://www.envisens.com/?lang=en>) on the design of an innovative kind of floating atmospheric drop sonde, an **ultra-light expendable radio-sonde able** to measure in-cloud fluctuations of aerosol concentration (drop- and floating models via scatterometry of optical and IR frequencies).

In representation of the Politecnico di Torino, I was invited to the VentureFest 2012, Building a Better Economy, chairman Dave Weller, June 19, 2012, Oxford, UK. <http://www.venturefestoxford.com/>. Two talks: -- Electron Guns for Detecting Space Objects and Movements and -- Turbulence Mixing and the Study of Clouds.

In relation to the good performances of the electron gun built to produce the fluorescence emission in the hypersonic jets experiment and on the base of the interest shown by the group of Piet Van Duppen, KU Leuven, 2011 ERC Advanced Grant (HELIOS: Heavy Element Laser Ionization Spectroscopy) and by the ATT representative at the Oxford 2012 Venturefest, the managers of the Incubators of the Politecnico di Torino

and Politecnico di Milano are considering the possibility to sponsor a joint spin-off dedicated to the design of high quality competitive cost electron guns for laboratory research and electronic microscopes.

Technology transfer activity. Innovative unsteady methods for the numerical simulation of turbulent flows on aircraft surfaces (2006-2009). Unsteady simulation, wall turbulence, LES, wall treatment, subgrid modeling
Grant E 60, Bando sulla ricerca scientifica applicata 2004 della Regione Piemonte per il settore d'intervento Aeronautica e Spazio. First on the list of the 17 appointed grants (mark 92/100, euro 64,932.00)

Business collaboration: Alenia Aeronautica Torino

Person in charge: Nicola Ceresola

Qualification: Principal research engineer

Company: Alenia Aeronautica

Department: Research and Development

Address: Alenia Aeronautica - Corso Marche 41 Torino

E-mail: nceresola@aeronautica.alenia.it

3. Professional activity for the scientific community

- *Physica D Nonlinear Phenomena*, Elsevier,
www.journals.elsevier.com/physica-d-nonlinear-phenomena/
2010/2012 Proposal and Guest Editors D. Tordella and K.R.Sreenivasan of the Special Issue "Small Scale Turbulence", see Elsevier Agreement, title T6.

Physica D: Nonlinear Phenomena

Volume 241, Issue 3, Pages 135-314 (1 February 2012)

Special Issue on Small Scale Turbulence

Edited by Daniela Tordella and Katepalli Sreenivasan

Volume Preface and paper collection at <http://www.sciencedirect.com/science/journal/01672789/241/3>

- *New Journal of Physics*, Institute of Physics,

<http://iopscience.iop.org/1367-2630>

2013 ----- **Special Focus on Astrophysical Jets**, [http://iopscience.iop.org/1367-](http://iopscience.iop.org/1367-2630/page/Focus%20on%20series)

[2630/page/Focus%20on%20series](http://iopscience.iop.org/1367-2630/page/Focus%20on%20series) **Editors** Paul Bellan, Attilio Ferrari, Tom P Ray and Daniela Tordella,

First articles published December 2013

- Proceedings of the Euromech Colloquium ***Small Scale turbulence and related gradient statistics*** (Turin, October 26-29, 2009), Accademia delle Scienze di Torino. 144 pp., ill., b/n 2009 (issued onl 23.10.2009), <http://www.accademiadelle scienze.it/attivita/editoria/periodici-e-collane/atti/fisici/142-supplemento> *Edited by* Daniela Tordella: Politecnico di Torino, Dipartimento di Ingegneria Aeronautica e Spaziale (DIASP); Katepalli R. Sreenivasan: The Abdus Salam - International Centre for Theoretical Physics, Trieste (ICTP), ISBN 88-901608-4-5, ISSN: 0001-4419
- After giving the seminar in Cambridge, MIT, Thursday, April 1, 2010, Department of Mathematics: "Transients of Three-dimensional Perturbations and the Role of Long Waves in the Plane Wake. Relationships with Turbulence", <http://math.mit.edu/seminars/nmpde/>, I was invited by the Editor in Chief of the World Scientific Editing Company, Prof. K.K. Phua, to write a lecture notes volume on the subject. The volume is in preparation.

Reviewing activity for International Journals

I am very often asked by Journal Editors to both review papers and act as arbiter between referees with different opinions. I put a lot of efforts in preparing helpful comments and this shows to be appreciated by the Editors. This activity started to be significant in 2001 and over the years increased in intensity. In the last years, on the average, I am asked to prepare two referee reports per month. The list of Journals is the following:

- *New Journal of Physics*,
- *Proceedings of the Royal Society, Series A*
- *Physical Review Letters*,
- *Physical Review E*,

- *Physics of Fluids*,
- *Journal of Computational Physics*,
- *Journal of Fluid Mechanics*,
- *Journal of Turbulence*
- *Physics Letters A*,
- *Journal of Zhejiang University - Science A*
- *Acta Mechanica*,
- *Computer Physics Communication*,
- *Archive of Applied Mechanics*,
- *Quarterly Journal of Mechanics and Applied Mathematics*.
- *Mathematical Models and Methods in Applied Sciences*.

Evaluation activity for International Research Project Proposals

- *Swiss Federation, State Secretariat for Education and Research SER, evaluations for the Swiss participation to EU VI and VII Frame Work Programs*,
http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/ch/organisation/organisation_miq_0007
- *EU VII Frame Work Program, COST (European Cooperation in Science and Technology) Actions*,
http://www.cost.eu/domains_actions
- *Exact Sciences & Technology, Israel Science Foundation, 2014*.
http://www.isf.org.il/english/judge.asp?menu_to_open=review

Referee for international associate professor qualifications

- 2010, Tel Aviv University, <http://english.tau.ac.il/>
 - 2003, The Texas University at Austin, <http://www.utexas.edu/>
- **Official research and positions as Scholar/ Visiting Professor in international highly qualified universities and research centres.**

Invitation by David Gross (Noble Laureate 2004 and KITP Director) to participate to the 2011 Program the Nature of Turbulence Kavli Institute for Theoretical Physics, University of California Santa Barbara. See Title 5. Kavli Institute for Theoretical Physics, University of California Santa Barbara, March-April 2011. Visiting Scholar Fellowships, Title 5.

University of Washington, Department of Aeronautics and Astronautics, 8/1986 12/1987, under the Fellowships:

- 1986 Fulbright fellowship to carry out scientific research in the United States
 - 1987 NATO-CNR Advanced Research Fellowship
- See Titles 19-20-21-22.

Visiting Scholar at the Karl Weierstrass Institut für Angewandte Analysis und Stochastik, Berlin, guest Prof. Dr. S. Proessdorf. July-August 1992. Title 23.

- **Prizes and awards awarded to the candidate for his/her scientific activity and project activity in the Academic Fields ("Settori Concorsuali"), where this is appropriate.**

- 1988 NATO-CNR Award for the research activity carried out abroad, see Title 20.
- 2005 America Physical Society-Division Fluid Dynamics Mobility Award
- 2012 Article "Astrophysical jets: insights into long-term hydrodynamics" (<http://iopscience.iop.org/1367-2630/13/4/043011>) published in 2011 in New Journal of Physics (NJP) selected for inclusion in the 'Highlights of 2011' collection. Articles chosen on the basis of referee endorsement, impact and broad appeal. Full list of selected article highlights at <http://iopscience.iop.org/1367-2630/page/Highlights%20of%202011>.

For the Certificate formally recognising the inclusion, see Title 4.

- 2014, Selection of the project "*Fluid turbulence: self and passive scalar diffusion*."

Application to stably stratified flows" as PRACE success story published in the PRACE Report 2013, see pages 13-14 <http://www.prace-ri.eu/>, see Titles 1 and 2.

- **Participation in international conferences, as a distinguished invited speaker; participation in the scientific committees of International Conferences.**

33 Invited Seminars and Conference Talks in Europe and USA. The list, see below, includes Institutions as the Massachusetts Institute of Technology, the California Institute of Technology, the University of Washington, the Politecnico di Milano, the Boeing Aerodynamics Division in Seattle, the University of California Santa Barbara (KITP), the Imperial College London, the Max Plank Institute for Dynamics and Self-Organization, the Princeton University, l'Ecole Normale Superieure in Lyon, the Stuttgart University, the Karl Weierstrass Institute in Berlin, the CIRA in Capua, the Universita' degli Studi La sapienza, the University of Oxford, the ICTP in Trieste, the Darmstadt University, etc.

Invited Talks

- July 4th 2013, *Survival distribution of the stretching and tilting of vortical structures in isotropic turbulence. Anisotropic filtering analysis, International Workshop on Small Scale Turbulence, Robert Antonia 70th birthday, Rouen, France.*
- June 19th, 2012, Oxford (UK), *Turbulence mixing and the study of clouds, VentureFest, Building a Better Economy, Said Business School, Oxford University.*
- June 20th, 2012, Oxford (UK), *Electron Guns for detecting Space Objects and Movements, VentureFest, Building a Better Economy, Said Business School, Oxford University.*
- September 15, 2011, Warsaw, *Shearfree turbulent mixing in presence of a passive scalar and density stratification, Meeting E-COST, European Turbulence Conference*
- March 23rd 2011, *The Nature of Turbulence, UC Santa Barbara, Kavli Institute for Theoretical Physics. 11:00 a.m. Daniela Tordella, Politecnico di Torino & KITP Discussion: On Collective Behaviour of Travelling 3D Perturbations in Shear Flows [Slides][Podcast][Aud][Cam]*
- March 24th 2011, *The Nature of Turbulence, UC Santa Barbara, Kavli Institute for Theoretical Physics 1:00 p.m. Daniela Tordella Politecnico di Torino & KITP Small Scale Anisotropy in Turbulent Shearless Mixing[Slides][Podcast][Aud][Cam]*
- July 13th 2010, *Turbulent diffusion in flat turbulence, J.C. Vassilicos chair, Qualitative Universality, Large and Small-Scale Coherent Structures and Long-Range Memory in Turbulent Flows, July 12-15 2010 - IMS Institute for Mathematical Sciences, Imperial College London, <http://www3.imperial.ac.uk/mathsinstitute>*
- 1 April 2010, *Massachusetts Institute of Technology NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS Seminar, Transients of Three-dimensional Perturbations and the Role of Long Waves in the Plane Wake. Relationships with Turbulence, Ruben R. Rosales chair, Thursday, April 1, 2010, 16:00 PM, Building 2, Room 105.*
- 17 March 2010, *Hydrodynamics of hypersonic jets: experiments and numerical simulations, California Institute of Technology, (chair Paul M. Bellan, 8th International Conference on High Energy Density Laboratory Astrophysics, March 15-18, 2010, Pasadena, California, USA, <http://hedla2010.caltech.edu/>*
- May 8, 2009, *Interaction of two isotropic turbulent fields: The two and three-dimensional case, large and small scale anisotropy and diffusion speed (chair E.Bodenschatz, International Workshop: Solving the riddle of Turbulence: What, Why, and How?, May 6 - 9, 2009 Max Plank Institute for Dynamics and Self-Organization, Gottingen, Germany. <http://www.lfpn.ds.mpg.de/conference09>*
- December 19th, 2008, *Statistics of the interaction between two isotropic turbulent fields and perspectives. Lyon, Ecole Normale Superieure, France (chair, Jean Francois Pinton, International Cooperation on Turbulence Research), <http://www.ictr.eu>*
- July 2, 2008, *Determination of Density and concentration from fluorescent images of a gas flow, Ludwig Prandtl - Fluid Dynamics Seminar (chair E.Bodenschatz), Max Plank Institute for Dynamics and Self-Organization, Gottingen, Germany.*
- 10 June 2008 *Velocity derivative statistics in the shearless mixing, European Mechanics Society, Euromech Colloquium 501, Mixing of coastal, estuarine and riverine shallow flows, Ancona , G.J.van Heijst, M.Brocchini hosting.*
- June 13, 2007 *Orr-Sommerfeld Theory of Stability, Progress one-hundred years since its first formulation, Accademia delle Scienze, Classe di Scienze Matematiche, Fisiche e Naturali, Turin, June 13, 2007*

-September 29, 2007 New developments in laboratory hypersonic jets, Work Shop of the Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas (CMSO), Alba.

-July 13 2006 -Simulazioni di larga scala, esempi, recenti innovazioni di metodo e discussione critica, CIRA, Capua.

-December 12th 2005 - Dipartimento di Matematica del Politecnico di Milano, nell'ambito delle iniziative MOX-Modellistica e Calcolo Scientifico, " Numerical experiments on the intermediate asymptotics of shear-free turbulent transport and diffusion. Associated similarity analysis".

-October 5th 2005 - Princeton Plasma Physics Laboratory, Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas (CMSO), "Simulation of turbulent flows, Supersonic jet experiments", Princeton.

-December 6th 2004 - Large Eddy Simulations method: subgrid models, new wall treatment and boundary conditions. Seminar held at INSA - Centre de Thermique de Lyon, Bat. Sadi Carnot - 69621 Villeurbanne.

-December 22nd 2004 -Turbolenza disomogenea nei fluidi: nuovi risultati per mescolamenti incompressibili e comprimibili. Politecnico di Torino, Dipartimento di Energetica.

-Sept 16th 2004 -Turbulence and instability. Joint Meeting, Ecole Doctorale MEGA de Lyon and Ecole Doctorale SCUDO de Turin. Ecole Centrale Lyon, LMFA.

-June 14th 2004 A new treatment for the large-eddy simulation of near-wall turbulence. Turbulence modelling: art or Science? A symposium in honour of Prof. J. Mathieu. Ecole Centrale Lyon, LMFA.

-February 6th 2004 -LES models. Workshop: High Performance Computing for DNS-LES in Italy, International Center for Theoretical Physics Trieste, February 6, 2004.

-Sept 21st 2000 -Dipartimento di Fisica, Universita' della Calabria, "Large eddy simulation application to the numerical simulation of astrophysical jets. Introduction to the use of the dynamical procedure", Cetraro.

-June 27th 2000 -Dip. di Matematica, Universita' di Torino, "Unbounded 2D flow past a finite body: boundary conditions and asymptotic behaviour".

-March 19th 1999 -Dip. di Fisica, Universita' di Pisa, "Progetto di un esperimento sull' evoluzione spaziale di lungo termine dei getti ipersonici in parziale similitudine con i getti interstellari".

-October 11th 1995 -Dip. di Fisica, Universita' di Torino, "Mescolamenti turbolenti: effetto della compressibilita' sul tasso di crescita spaziale".

-Nov 16th 1992 -Department of Aeronautics and Astronautics, University of Washington, "On the first instability in the transient regime of flow past a circular cylinder", Seattle.

-Nov 17th 1992 -Boeing Defense and Space Group, Kent, WA, USA, "Non steady stability of the flow around the circle in the F⁺⁺oppl model", 17 November 1992.

-August 5th 1992 -Institut fur Angewandte Analysis und Stokastik, Karl Weierstass Institut -Berlin, "A simple model for the aerodynamics of lunate wings".

-July 22 1992 -Department of Mathematic, Technical Hoshshoole of Darmstadt, "Aerodynamics of curved lifting surfaces".

-May 24th 1991 -Dipartimento di Ingegneria Idraulica, Universita` La Sapienza, Roma, "Una critica all'applicazione del modello di Landau alla genesi della prima instabilita` nei flussi di scia transienti".

-April 18th 1991 -Dip. Ing. Aeronautica e Spaziale, Politecnico di Torino, "Sul flusso vorticoso inviscido attorno al cerchio nella rappresentazione di F⁺⁺oppl: effetto delle non stazionarieta` asintotiche sull'instabilita` del moto.

-Nov 7th 1990 -Universitat Stuttgart, Mathematisches Institut A, "Lunate wings in nature and their mathematical representation for the stationary motion condition".

-Jan 29th 1988 -Dipartimento di Ingegneria Aeronautica e Spaziale, Politecnico di Torino, "Analisi Spettrale di uno Strato di Mescolamento Forzato".

-Feb 18th 1987 -Department of Aeronautics and Astronautics, University of Washington, Seattle, "Forced 2D Turbulent Free Shear Layers".

-June 11th 1986 -Dipartimento di Energetica, Politecnico di Torino, "Misura delle concentrazioni in fluidodinamica, tecniche puntuali e tecniche 2D".

Conferences and Work-shops Proposals and Organization

- Proposal and organization of the Euromech Colloquium

Small scale turbulence and related gradient statistics. Results from laboratory and direct numerical simulations. <http://www.euromech512.polito.it/> European Mechanics Society, www.euromech.org Prof. P.Huerre, President. See T7. Date and location: October 26-29, 2009, Turin, Accademia delle Scienze <http://www.accademiadellescienze.it/accademia>. Chairpersons: D. Tordella,

Politecnico di Torino and K.R.Sreenivasan, Director of the Abdus Salam International Centre for Theoretical Physics, Trieste, Italy (current address NYU, Courant Institute).

- 3rd ICTR Meeting. Organization and Chairpersons D.Tordella and F.Toschi, www.ictr.eu
Politecnico di Torino, Turin, October 30-31 2009.
- Organization of the Workshop on Non-linear and Dissipative Processes in Fluid Dynamics and Astrophysical Plasmas, Politecnico di Torino, Turin, December 9-10, 1999.
- Organization of the International Conference in Memory of Professor Carlo Ferrari, Politecnico di Torino, Turin, April 3-4 1998.

International Evaluation at Politecnico di Torino, May 2008

In April-may 2008, the Politecnico di Torino has carried out an internal evaluation of the research activity of assistant and associate professors that was based also on the opinion of international referees. I was included in the list of the 30 associate professors (out of the 246 initial participants to the evaluation) whose CV was sent to the international referees. See T24 with contains the referee report, see also the attached communication of the Prorector Prof. M Gilli in date 8-05-2008.

- **Management and organisation of exhibitions, compositions, drawings, design, hand-crafted items, prototypes, artwork and their projects, databases and software, thematic maps, for the Academic Fields (*"Settori Concorsuali"*), where this is appropriate.**

Databases and software. I designed the research group website called [PhiloFluid](http://areeweb.polito.it/ricerca/philofluid/) <http://areeweb.polito.it/ricerca/philofluid/> of which I am the scientific responsible and administrator and that was opened in April 2012. The site also contains a section dedicated to databases <http://areeweb.polito.it/ricerca/philofluid/database.html> and a section dedicated to software open access under **GNU General Public Licenses** <http://areeweb.polito.it/ricerca/philofluid/software.html>. To date, the site has been visited 31253 times, which places it in the fifth position among the most visited POLITO engineering research websites.

4. Teaching activity

- Formal responsibility of Bachelor's (Laurea) and Master of Science's (Laurea Magistrale) degree courses in Italian universities.

Courses Taught at Politecnico di Torino

- Gasdinamica II, Aeronautics and Aerospace Engineering Bachelor, co-instructor 1984/85, 1985/86.
- Experimental Aerodynamics, Aeronautics and Aerospace Engineering Bachelor, co-instructor 1988/89, 1990/1991.
- Fluid Dynamics, Mechanical Engineering Bachelor, co-instructor 1989/90, 1990/91, 1991/92.
- Physics of Fluids, Aeronautics and Aerospace Engineering Bachelor, co-instructor 1989/90, 1990/91, 1991/92.
- Seminars of Introduction to the Bachelor in Mathematics for Engineering Sciences 1990/91, 1991/92.
- Fluid Dynamics, Master of Science in Mechanical Engineering, 1992/93 - 2004/05.
- Environmental Fluid Dynamics, Master of Science in Environmental Engineering, 1997/98.
- Fluid Dynamics, 05AYFGE, Laurea Magistrale in Mathematics for the Engineering Sciences, 2002/2003 - present.

- Numerical Simulation of Turbulent Flows, 01IIJFQ, Laurea Magistrale in Aeronautics and Aerospace Engineering, 2006/2007 – 2011/2012.

-Turbulent Flows, 02GDWFQ, Laurea Magistrale in Aeronautics and Aerospace Engineering, 2007/2008 – present

Laurea Magistrale (M. Sc.) Student Supervision

Current Master Students: Sadaphul Abhishek, Luigi Caruso, Cosimo Spagnolo, Aerospace Engineering;

Loris Domenicale, Master in Applied Math

Previous:

Luca Gallana, Master Student Aerospace Engineering, 2012

Andrea Boscolo, Master Student Aerospace Engineering, 2013

Federico Fraternali, Master Student Aerospace Engineering, 2013

Aerospace Engineering:

Fabrizio Donati, Master Degree, 2011

Alessandro Cappello, Bachelor Degree, 2011

Giuseppe Barletta, Bachelor Degree, 2011

Andrea Tinelli, Bachelor Degree, 2011

Salvatore Sedda, Bachelor Degree, 2010

Fabio Crescenti, Bachelor Degree, 2010

Enrico Deusebio, Master Degree, 2009

Michele Rosso, Master Degree, 2009

Andrea Boscolo, Bachelor Degree, 2009

Luca Gallana, Bachelor Degree, 2009

Tecla Spelgatti, Master Degree, 2008

Stefano Morelli, Master Degree, 2007

Michele Lavecchia, Master Degree, 2007

Gian Mauro Maneia, Master Degree, 2007

Fabrizio Luigi Rosati, Master Degree, 2004

Gabriele Aranud, Master Degree, 2001

Sergio Giordana, Master Degree, 2000

Gianluca Nicchi, Master Degree, 1999

Mathematical Engineering:

Marco Mastinu, Master Degree, 2011

Francesca De Santi, Master Degree, 2010

Elisabetta Filippo, Master Degree, 2010

Michele Dioguardi, Master Degree, 2007

Francesca Asteggiano, Master Degree, 2007

Giorgio Seracchioli, Master Degree, 2007

Luca Sitzia, Master Degree, 2007

Alessandro Zito, Master Degree, 2006

Sandro Vitale, Master Degree, 2005

Stefania Scarsoglio, Master Degree, 2004

Mechanical Engineering:

Federico Andrea Babini, Bachelor Degree, 2011

Giovannino Pinna, Bachelor Degree, 2011

Sebastiano Scandaliato, Bachelor Degree, 2011

Domenica Luisa Cioce, Bachelor Degree, 2010

Federico Montaldo, Bachelor Degree, 2010

Daniele Romano, Bachelor Degree, 2009

Massimo Giampaolo, Bachelor Degree, 2002

Gianluca Sperti, Master Degree, 1997

Michele Iovieno, Master Degree, 1997

ENSTA, Ecole National Supérieure des Techniques Appliquées, Paris, supervision of 3 Master Students

During their stages abroad, Marie Petitot 2012, Ouael mansour 2013, Mathieu-Catchirayer 2013

In the years 1999-2004 in the context of the Erasmus EU Program, in collaboration with the Imperial College of London, I had been a co-advisor for four Bio-Engineering students.

Years 1989-1999: Advisor and referee for 18 students who have completed their degrees in Mechanical Engineering, Aerospace Engineering, Bio-Engineering, Environmental Engineering and Mathematics for the Engineering Sciences.

- **Formal responsibility of PhD courses in Italian universities.**

- 02LDJKH, **Introduction to the Hydrodynamic Stability**, SCUODO, Doctorate School of the Politecnico di Torino, 2005-- present.

Teaching in International Centers and or Foreign Univeristy

- International Center for Mechanical Sciences (CISM, <http://www.cism.it>), **Dynamics of the Flow Past a Bluff Body**, Advanced Doctoral School coordinated by D.Tordella, The Fiszdon Session, Udine, Academic Year 2006.
- University of Washington, Department of Aeronautics and Astronautics, <https://www.washington.edu/> Tutorials and seminars to Master Students (Aerospace Master of Engineering), Winter term 1986 and Spring term 1987.

5. Institutional offices and roles in Italian Universities

Board of Advisors of the Course of Doctorate in Fluid Dynamics, Consortium Politecnico di Torino and Universita' degli Studi di Torino, 1994 – present

Board of Advisors of the Course of Doctorate in Mathematics for the Engineering Sciences of the Politecnico di Torino, 2009 – present

Coordinator of the Aerospace Departmental Library of the Politecnico di Torino, 2000 – 2013

Member of the Scientific Committee of the Library System of the Politecnico di Torino, 2004 - present

National Committee (Member Elected) for Associate Professorship Qualifications, call by the Universita' di Bologna, 2001

National Committee (Member Elected) for the Associate Professorship Qualifications call by the Politecnico di Milano, 2005

Committee of the Engineering Faculty of the Politecnico di Torino for tenure track positions of Assistant Professor (1996-2002).

DIASP, Department of Aeronautical and Space Engineering, Member Elected of the Executive Board (Giunta Dipartimentale), 2008-2010.

- **Management roles in Universities, as part of Faculty duties.**

Member of Scientific Advisory Board of the Politecnico di Torino Library System of the Politecnico di Torino (Sistema Bibliotecario Politecnico di Torino, <http://www.biblio.polito.it/>), 2006-2013.

Complete List of Publications, from PORTO Publications Open Repository Torino, last update: 06/08/2014 19.56.53

Journal Articles

- 9999** F De Santi, W O Criminale, S Scarsoglio, D Tordella, Parametric perturbative study of the supercritical cross-flow boundary layer, in revision for INTERNATIONAL JOURNAL OF HEAT AND FLUID FLOWS, Elsevier, August 2014
- 2014** M Belan, D Tordella, S De Ponte, A Mignone and S Massaglia, Hypersonic jets in astrophysical conditions: focus on spreading and asymmetric stability properties, NEW JOURNAL OF PHYSICS, Institute of Physics, pp.12, 2014, Vol. **16** 085002, ISSN: 1367-2630, DOI:10.1088/1367-2630/16/8/085002
- 2014** M. Iovieno, S. Di Savino, L. Gallana, D. Tordella, Mixing of a passive scalar across a thin shearless layer: Concentration of intermittency on the sides of the turbulent interface, JOURNAL OF TURBULENCE, Taylor & Francis, pp. 24, 2014, Vol. 15, ISSN: 1468-5248, DOI: 10.1080/14685248.2014.905393
- 2014** D. Tordella, S. Di Savino, L. Sitzia, Large fluctuations of the nonlinearities in isotropic turbulence. Anisotropic filtering analysis, PHYSICA D-NONLINEAR PHENOMENA, Elsevier, pp. 11, 2014, Vol. 284, ISSN: 0167-2789, DOI: 10.1016/j.physd.2014.05.001
- 2013** Bailey P., Abba' A., Tordella D., Pressure and kinetic energy transport across the cavity mouth in resonating cavities, PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS, APS The American Physical Society, pp. 11, 2013, Vol. Phys. Rev. E 87, 013013, ISSN: 1539-3755, DOI: 10.1103/PhysRevE.87.013013
- 2013** Tordella D., Iovieno M., Massaglia S., Mignone A., Large-eddy simulation of hypersonic flows. Selective procedure to activate the sub-grid model wherever small scale turbulence is present., COMPUTER PHYSICS COMMUNICATIONS, Elsevier, pp. 11, 2013, Vol. 184, ISSN: 1879-2944, DOI: 10.1016/j.cpc.2013.06.012
- 2013** M. Belan, S. Massaglia, D. Tordella, M. Mirzaei, S. de Ponte, The Hydrodynamics of Astrophysical jets: Scaled Experiments and Numerical Simulations , ASTRONOMY & ASTROPHYSICS, EDP Sciences, pp. 9, 2013, Vol. 554, ISSN: 0004-6361, DOI: <http://dx.doi.org/10.1051/0004-6361/201321040>
- 2012** D. Tordella, K.R. Sreenivasan, Preface, PHYSICA D-NONLINEAR PHENOMENA, Elsevier, pp. 2, 2012, Vol. 241, ISSN: 0167-2789, DOI: 10.1016/j.physd.2011.11.013
- 2012** Tordella D., Iovieno M., Decaying turbulence: what happens when the correlation length varies spatially in two adjacent zones, PHYSICA D-NONLINEAR PHENOMENA, Elsevier, pp. 8, 2012, Vol. 241, ISSN: 0167-2789, DOI: 10.1016/j.physd.2011.09.001
- 2011** Tordella D., Iovieno M., Small scale anisotropy in turbulent shearless mixing, PHYSICAL REVIEW LETTERS, American Physical Society, pp. 5, 2011, Vol. 107, ISSN: 0031-9007, DOI: 10.1103/PhysRevLett.107.194501
- 2011** S. Scarsoglio, F. De Santi, D. Tordella , Collective behaviour of linear perturbation waves observed through the energy density spectrum, JOURNAL OF PHYSICS. CONFERENCE SERIES, Institute of Physics, pp. 6, 2011, Vol. 318, ISSN: 1742-6588, DOI: 10.1088/1742-6596/318/3/032004
- 2011** L. Sitzia, S. Di Savino, D. Tordella , Cumulative distribution of the stretching of vortical structures in isotropic turbulence, JOURNAL OF PHYSICS. CONFERENCE SERIES, Institute of Physics, pp. 6, 2011, Vol. 318, ISSN: 1742-6588, DOI: 10.1088/1742-6596/318/6/062006
- 2011** TORDELLA D.; MARCO BELAN; SILVANO MASSAGLIA; SERGIO DE PONTE; ANDREA MIGNONE; EBERHARD BODENSCHATZ; ATTILIO FERRARI, Astrophysical jets: insight into long term hydrodynamics. Article and Supplementary Information., NEW JOURNAL OF PHYSICS, Institute of Physics, pp. 26, 2011, Vol. 13, ISSN: 1367-2630, DOI: 10.1088/1367-2630/13/4/043011
- 2011** MARCO BELAN; ; SERGIO DE PONTE; TORDELLA D.; SILVANO MASSAGLIA; ANDREA MIGNONE; Bodenschatz E.; ATTILIO FERRARI, Hydrodynamics of Hypersonic Jets: Experiments and Numerical Simulations., ASTROPHYSICS AND SPACE SCIENCE, Springer, pp. 6, 2011, Vol. 336, ISSN: 0004-640X, DOI: 10.1007/s10509-011-0600-6
- 2010** SCARSOGLIO S; TORDELLA D.; CRIMINALE W.O, The role of long waves in the stability of the plane wake, PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS, pp. 9, 2010,

Vol. 81, ISSN: 1539-3755, DOI: 10.1103/PhysRevE.81.036326

- 2010** BELAN M; DE PONTE S; TORDELLA D., Highly underexpanded jets in the presence of a density jump between an ambient gas and a jet, PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS, American Physical Society, pp. 10, 2010, Vol. 82, ISSN: 1539-3755, DOI: 10.1103/PhysRevE.82.026303
- 2009** TORDELLA D.; SCARSOGLIO S, The first R_{cr} as a possible measure of the entrainment length in a 2D steady wake, PHYSICS LETTERS A, pp. 6, 2009, Vol. 373, ISSN: 0375-9601, DOI: 10.1016/j.physleta.2009.01.063
- 2009** SCARSOGLIO S; TORDELLA D.; CRIMINALE W.O, An exploratory analysis of the transient and long-term behavior of small three-dimensional perturbations in the circular cylinder wake, STUDIES IN APPLIED MATHEMATICS, Massachusetts Institute of Technology, pp. 21, 2009, Vol. 123, ISSN: 0022-2526, DOI: 10.1111/J.1467-9590.2009.00449.X
- 2008** MANEIA G; TRIBUZI C; TORDELLA D., Aerodynamics of a rigid curved kite wing, AIAA JOURNAL, 2008, ISSN: 0001-1452
- 2008** TORDELLA D.; IOVIENO M; MASSAGLIA S, Small scale localization in turbulent flows. A priori tests applied to a possible Large Eddy Simulation of compressible turbulent flows (vol.176, pg. 539, 2007), COMPUTER PHYSICS COMMUNICATIONS, Elsevier, pp. 2, 2008, Vol. 178, ISSN: 0010-4655, DOI: 10.1016/j.cpc.2008.02.005
- 2008** BELAN M; DE PONTE S; TORDELLA D., Determination of density and concentration from fluorescent images of a gas flow, EXPERIMENTS IN FLUIDS, 2008, Vol. 45, ISSN: 0723-4864, DOI: 10.1007/s00348-008-0493-5
- 2008** TORDELLA D.; MICHELE IOVIENO; PETER ROGER BAILEY, Sufficient condition for Gaussian departure in turbulence, PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS, The American Physical Society, pp. 10, 2008, Vol. 77, ISSN: 1539-3755, DOI: 10.1103/PHYSREVE.77.016309
- 2007** TORDELLA D.; SCARSOGLIO S AND BELAN M, Hydrodynamics linear stability theory. A comparison between Orr-Sommerfeld modal and initial value problem analyses, MEMORIE DELLA ACCADEMIA DELLE SCIENZE DI TORINO. CLASSE DI SCIENZE FISICHE MATEMATICHE E NATURALI, 2007, Vol. Serie V, Volume 31, ISSN: 1120-1630
- 2007** TORDELLA D; IOVIENO M.; MASSAGLIA S, Small scale localization in turbulent flows. A priori tests applied to a possible Large eddy Simulation of compressible turbulent flows, COMPUTER PHYSICS COMMUNICATIONS, Elsevier, pp. 11, 2007, Vol. 176, ISSN: 0010-4655, DOI: 10.1016/j.cpc.2006.12.004
- 2006** TORDELLA D.; IOVIENO M, Numerical experiments on the intermediate asymptotics of shear-free turbulent transport and diffusion, JOURNAL OF FLUID MECHANICS, Cambridge University Press, pp. 13, 2006, Vol. 549, ISSN: 0022-1120, DOI: 10.1017/S0022112005007688
- 2006** BELAN M; TORDELLA D., Convective instability in wake intermediate asymptotics, JOURNAL OF FLUID MECHANICS, 2006, Vol. 552, ISSN: 0022-1120, DOI: 10.1017/S0022112006008627
- 2006** TORDELLA D.; S.SCARSOGLIO; M.BELAN, A synthetic perturbative hypothesis for the multiscale analysis of the wake instability, PHYSICS OF FLUIDS, AIP, pp. 10, 2006, Vol. 18, ISSN: 1070-6631, DOI: 10.1063/1.2201114
- 2005** TORDELLA D.; BELAN M., On the domain of validity of the near-parallel combined stability analysis for the 2D intermediate and far bluff body wake, ZEITSCHRIFT FUR ANGEWANDTE MATHEMATIK UND MECHANIK, WILEY-BLACKWELL, pp. 15, 2005, Vol. 85(1), ISSN: 0044-2267
- 2004** BELAN M.; DE PONTE S.; MASSAGLIA S.; TORDELLA D., Experiments and numerical simulations on the mid-term evolution of hypersonic jets; Astrophys. Space Sci., ASTROPHYSICS AND SPACE SCIENCE, 2004, Vol. 293 (1-2), ISSN: 0004-640X
- 2004** M. IOVIENO; G. PASSONI; TORDELLA D., A new large-eddy simulation near-wall treatment, PHYSICS OF FLUIDS, AIP American Institute of Physics, pp. 10, 2004, Vol. 16, ISSN: 1070-6631, DOI: 10.1063/1.1783371
- 2003** M.IOVIENO; TORDELLA D., Variable scale filtered Navier-Stokes Equations. A new procedure to deal with the associated commutation error, PHYSICS OF FLUIDS, American Institute of Physics, pp. 11, 2003, Vol. 15, ISSN: 1070-6631, DOI: 10.1063/1.1577345
- 2003** TORDELLA D.; M. BELAN, A new matched asymptotic expansion for the intermediate and far flow behind a finite body, PHYSICS OF FLUIDS, AIP, pp. 10, 2003, Vol. 15, ISSN: 1070-6631, DOI:

10.1063/1.1580482

- 2003** TORDELLA D., The scientific work of Carlo Ferrari., ATTI DELLA ACCADEMIA NAZIONALE DEI LINCEI. CLASSE DI SCIENZE FISICHE, MATEMATICHE E NATURALI. RENDICONTI LINCEI. SUPPLEMENTO, 2003, Vol. serie 9 v. 14, ISSN: 1121-3094
- 2002** M. BELAN; TORDELLA D., Asymptotic expansions for two dimensional symmetrical laminar wakes, ZEITSCHRIFT FUR ANGEWANDTE MATHEMATIK UND MECHANIK, 2002, Vol. 82 (4), ISSN: 0044-2267
- 2002** M.IOVIENO; TORDELLA D., The angular momentum equation for a finite element of fluid: a new representation and application to turbulent modeling, PHYSICS OF FLUIDS, American Institute of Physics, pp. 10, 2002, Vol. 14, ISSN: 1070-6631, DOI: 10.1063/1.1485765
- 2001** M.IOVIENO; C.CAVAZZONI; TORDELLA D., A new technique for a parallel dealiased pseudospectral Navier-Stokes code, Comp. Phys. Comm., COMPUTER PHYSICS COMMUNICATIONS, 2001, Vol. 141, ISSN: 0010-4655
- 1997** CHIOCCIA G.; PROESSDORF S.; TORDELLA D., The lifting line equation for a curved wing in oscillatory motion, ZEITSCHRIFT FUR ANGEWANDTE MATHEMATIK UND MECHANIK, 1997, Vol. 77, ISSN: 0044-2267
- 1996** TORDELLA D.; R.E.BREIDENTHAL, Flow into a black hole, INTERNATIONAL JOURNAL OF MODERN PHYSICS A, 1996, Vol. 11 (1), ISSN: 0217-751X
- 1995** TORDELLA D., Nonsteady stability of the flow around the circle in the Foppl model, QUARTERLY OF APPLIED MATHEMATICS, 1995, Vol. LIII (4), ISSN: 0033-569X
- 1991** TORDELLA D.; CANCELLI C., First instabilities in the wake past a circular cylinder. Comparison of transient regimes with Landau's model, MECCANICA, pp. 9, 1991, Vol. 26, ISSN: 0025-6455
- 1991** S. PROSSDORF; TORDELLA D., On an extension of the Prandtl's lifting line theory to curved wings, IMPACT OF COMPUTING IN SCIENCE AND ENGINEERING, 1991, Vol. 3 (3), ISSN: 0899-8248
- 1989** TORDELLA D.; W.H. CHRISTIANSEN, Spectral Observation in a Forced Mixing Layer, AIAA JOURNAL, 1989, Vol. 27 (12), ISSN: 0001-1452

Articles in preparation

- ??** An attempt of SW spectral analysis from the V2 data at 5 AU 2, by F. Fraternali¹, L. Gallana¹, M. Iovieno¹, S. Fosson², E. Magli², M. Opher³, J.D. Richardson⁴, D. Tordella¹ (1:POLITO, Dimeas, 2: POLITO, Det, 3: BOSTON U., Astronomy D., 4: MIT, Kavli Inst.)
- ??** Turbulent shearless mixings in presence of stable and unstable local perturbation of the atmospheric standard temperature gradient. A preliminary modeling of the top and bottom moist-dry air interfaces, Gallana L.¹, De Santi F.¹, Di Savino S.¹, Iovieno M.¹, Richiardone R.², Tordella D.¹, (1:POLITO, Dimeas, 2: UNITO, Dip. Fisica)
- ??** An attempt of SW spectral analysis from the V2 data at 5 AU 2, by F. Fraternali¹, L. Gallana¹, M. Iovieno¹, S. Fosson², E. Magli², M. Opher³, J.D. Richardson⁴, D. Tordella¹ (1:POLITO, Dimeas, 2: POLITO, Det, 3: BOSTON U., Astronomy D., 4: MIT, Kavli Inst.)
- ??** Properties and three-dimensional maps for non-modal perturbation of sheared flows., by F. Fraternali¹, F De Santi¹, S.Scarsoglio¹, G.Staffilani², D. Tordella¹ (1:POLITO, Dimeas, 2: MIT, Dept. of Mathematics)
- ??** Eulerian and Lagrangian measure of turbulent diffusion in two dimensions, by L.Ducasse, J.von Hardenberg, D. Tordella

Proceedings and Conferences

- 2014** Gallana L., De Santi F., Di Savino S., Iovieno M., Richiardone R., Tordella D., Turbulent transport across an interface between dry and humid air in a stratified environment, American Physical Society, 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA, Nov. 23-25, 2014
<http://www.aps.org/units/dfd/meetings/meeting.cfm?name=DFD14>

- 2014** F De Santi, S Scarsoglio, W O Criminale, D Tordella, Parametric study of perturbations in the cross-flow boundary layer, American Physical Society, 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA, Nov. 23-25, 2014
<http://www.aps.org/units/dfd/meetings/meeting.cfm?name=DFD14>
- 2014** Fraternali F., Gallana L., Iovieno M., Fosson S., Magli E., Opher M., Richardson J.D., Tordella D. Spectra and correlations in the solar wind from Voyager 2 around 5AU, American Physical Society, 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA, Nov. 23-25, 2014
<http://www.aps.org/units/dfd/meetings/meeting.cfm?name=DFD14>
- 2014** Fraternali F., Gallana L., Iovieno M., Richardson J.D., Tordella D. Solar wind plasma: turbulence signature in Voyager 2 1979 spectra, VORTICAL STRUCTURES AND TURBULENCE, Rome, Sept.19-20, 2014.
- 2014** Gallana L., De Santi F., Di Savino S., Iovieno M., Tordella D., Turbulent transport at a simplified clear air/cloud interface, V Turbulent Mixing and Beyond Workshop, International Center for Theoretical Physics, Trieste, August 04-09, 2014 <http://users.ictp.it/~tmb/>
- 2014** Fraternali F., Gallana L., Iovieno M., Richardson J.D., Tordella D., Turbulence in the solar wind: spectra from Voyager 2 data, V Turbulent Mixing and Beyond Workshop, International Center for Theoretical Physics, Trieste, August 04-09, 2014 <http://users.ictp.it/~tmb/>
- 2014** Gallana L., De Santi F., Di Savino S., Iovieno M., Tordella D., Passive scalar transport in a shearless flow in presence of stratification, XXXII UIT Heat Transfer Conference, Pisa, June 23-25, 2014
<http://www.uit2014pisa.com/>
- 2013** Kerr R., De Santi F., Tordella D., Parmar A., Stratified zig-zags on vortex pairs using vertically shifted perturbations, XXIII ICTAM, Beijing, China 19–24 August 2012, pp. 2.
- 2013** M. Belan, S. Massaglia, M. Mirzaei, D. Tordella, S. De Ponte, A. Mignone, A. Ferrari, E. Bodenschatz, An Investigation of the Hydrodynamics of Hypersonic Jets in Astrophysical Conditions, In: Titolo volume non avvalorato, EDP Sciences 2012 (www.eas-journal.org) (GBR), 1st European Conference on Laboratory Astrophysics-Paris 2012, Paris 26-30 September 2011, pp. 5, 2013, Vol. European Astronomical Society, Publications Series, vol.58, DOI: 10.1051/eas/1258022
- 2013** S. Di Savino, L. Gallana, M. Iovieno, D. Tordella, Transient formation of the passive scalar spectrum at a turbulent interface, In: XXI Congresso Aimeta - Volume dei Sommari, Edizioni Cortina (ITA), XXI Congresso AIMETA, Torino 17-20 settembre 2013, pp. 10, 2013, ISBN: 9788882391836
- 2013** A. Abbà, P.R. Bailey, D. Tordella, Cavity Flows: Change Of Regime In The Ratio Between The Pressure And Kinetic Energy Flows Across The Cavity Mouth., In: Titolo volume non avvalorato, 14th European Turbulence Conference, Lyon (F) 1-4 settembre 2013, pp. 2, 2013
- 2013** F. De Santi, S. Scarsoglio, W. O. Criminale, and D. Tordella, Role of the obliquity angle on the perturbed cross-flow boundary layer, In: XXI Congresso AIMETA, XXI Congresso AIMETA, Torino 17-20 Sept 2013, pp. 1, 2013, Vol. XXI
- 2013** S. Di Savino, L. Gallana, M. Iovieno, D. Tordella, Turbulent interfaces at sites to measure the passive scalar-velocity intermittency relationship, In: Titolo volume non avvalorato, 14th European Turbulence Conference, Lyon (F) 1-4 settembre 2013, 2013
- 2013** F. De Santi, S. Scarsoglio, W. O. Criminale, D. Tordella, Perturbed cross-flow boundary layer: nontrivial effects of the obliquity angle at small and high reynolds numbers, In: Titolo volume non avvalorato, 14th European Turbulence Conference, Lyon (F) 1-4 settembre 2013, pp. 2, 2013
- 2012** Iovieno M., Di Savino S., De Santi F., Tordella D., Intermittency layers associated to turbulent interfaces, In: Titolo volume non avvalorato, EFMC9 - 9th European Fluid Mechanics Conference, Roma (I) 9-13 September 2012, pp. 1, 2012
- 2012** Marco BELAN, Mohsen MIRZAEI, Sergio DE PONTE, TORDELLA D., AN EXPERIMENTAL SETUP FOR VISUALIZATIONS AND MEASUREMENTS ON FREE HYPERSONIC JETS, In: EPJ Web of Conferences, EDP Sciences, 2012, Experimental fluid mechanics 2011, Jicín, Czech Republic 22 - 25 November, 2011, pp. 14, 2012, Vol. 25, 01056 (2012), DOI: 10.1051/epjconf/20122501056
- 2012** S. Scarsoglio, F. De Santi, D. Tordella, Travelling perturbations in sheared flows: sudden transition infrequency and phase speed asymptotics, In: Titolo volume non avvalorato, 9th European Fluid Mechanics Conference (EFMC-9), Rome, Italy September 9-13, 2012, 2012
- 2012** F. De Santi, S. Scarsoglio, D. Tordella, On the frequency of hydrodynamic perturbations. Early and intermediate transients., In: Titolo volume non avvalorato, 6th European Postgraduate Fluid Dynamics Conference, London, UK July, 10-12, 2012, pp. 1, 2012, Vol. 6
- 2011** S. Scarsoglio, F. De Santi, M. Mastinu, G. Barletta, K. Weaver, D. Tordella, Energy spectrum power-law decay of linearized perturbed shear flows, In: Titolo volume non avvalorato, 5th European

- Postgraduate Fluid Dynamics Conference, Gottingen, Germany August, 9-12, 2011, pp. 1, 2011, Vol. 5
- 2011** Iovieno M., Ducasse L., Tordella D., Dimensionality influence on passive scalar transport, JOURNAL OF PHYSICS. CONFERENCE SERIES, In: JOURNAL OF PHYSICS. CONFERENCE SERIES, Institute of Physics (GBR), 13th European Turbulence Conference, Varsavia (Polonia) 12-15 settembre 2011, pp. 9, 2011, Vol. 318, ISSN: 1742-6588, DOI: 10.1088/1742-6596/318/5/052042
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