Allegato B

Davide Torlo
Curriculum Vitae

Place Trieste
Date 06/06/2023

Part I – General Information

Full Name	Torlo Davide
Citizenship	Italian
Spoken Languages	Italian, English, German

Part II – Education

Type	Year	Institution	Notes (Degree, Experience,…)
University graduation	2014	Università degli Studi di Milano Bicocca	Laurea triennale in Matematica L-35, voto 110/110 cum laude
University graduation	2016	Università degli Studi di Trieste	Laurea magistrale in Matematica LM-40, voto 110/110 cum laude
Master excellence program	2016	SISSA	Joint Curriculum between SISSA and University of Trieste during Master Degree
PhD	2020	University of Zurich	PhD at Mathematical Institute of Zurich under the supervision of prof. Rémi Abgrall. Thesis title: Hyperbolic Problems: High Order Methods and Model Order Reduction

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
12/21	now	SISSA Scuola internazionale degli studi superiori avanzati	Postdoctoral fellow on a Mathematical Fellowship (Borse d'eccellenza)
10/20	11/21	Inria Bordeaux - Sud-Ouest	Postdoctoral position
09/16	08/20	University of Zurich	Research assistant and teaching assistant

Part IV – Teaching experience

Year	Institution	Lecture/Course
2023	SISSA, Doctoral School	Instructor of "High order accurate time integration methods"
2021	Inria and University of Bordeaux, Doctoral School	Instructor of "High order accurate time integration methods"

2016 - 2020	University of Zurich	Teaching assistant for Bachelor and master students: Numerical Methods for Informatics, Analysis 1, Numerical Analysis, Numerical Methods for Hyperbolic PDEs
2018 - 2019	University of Zurich	Instructor of "Programming in Matlab"

Part V - Society memberships, Awards and Honors

2022	"Award for the best contribution" for the best talk at the conference "Computation of hyperbolic and related PDEs: A conference in honor of Remi Abgrall" for the talk "A new efficient explicit deferred correction framework: analysis and applications to hyperbolic PDEs and adaptivity"

Part VI - Funding Information

2021	I won a SISSA Mathematical Fellowship for a 3 years postdoctoral grant. The concourse evaluated the candidate and the project. My project "ALEADMOR" is about a model order reduction technique for advection dominated problems in an arbitrary Lagrangian-Eulerian setting. There were more than 70 candidates and 3 fellowships.
2020	Winner of a postdoctoral researcher position of 18 months in INRIA Bordeaux Sud Ouest on "Site specific ROM closure for small scales in near shore wave modeling"

Part VII – Research Activities

Keywords	Brief Description
Hyperbolic problems	From the PhD I have been working on numerical methods to approximate the solutions of hyperbolic partial differential equations developing, in particular, finite element methods for such problems. I was focusing on kinetic problems and on IMEX methods to solve them.
Arbitrarily high order methods	The techniques studied during the PhD were based on arbitrarily high order methods in space and time, allowing to obtain very accurate results. This gave me the opportunity to compare different arbitrarily high order methods as the Deferred Correction (DeC) and the Arbitrary Derivative (ADER) method to study their stability and their efficiency.
Structure preserving methods	During simulations of physical phenomena, it is of paramount importance to preserve some structural properties, such as positivity of density and pressure for gas dynamics or water height for shallow water equations, preservation of steady equilibria, moving equilibria, divergence–free character of the solutions and entropy inequalities. In my research, I have been developing several methods that aim at discretely provably preserving such properties.
Model order reduction	Another topic object of my research since my Master degree is model order reduction (MOR) methods. They aim at reducing the computational costs for parametric problems when many evaluations of the approximated solutions are too expensive to be performed. MOR techniques look for solutions in a reduced (linear) space. I am and I have been interested in developing such methods for various problems, in particular in the context of Uncertainty Quantification and for advection dominated problems.
Slow Kolmogorov n-width decay problems	When applying classical MOR techniques onto advection dominated problems with moving steep gradients, they often result in slow Kolmogorov n-width decay phenomena and poor approximation properties. To overcome this issue, I am working on MOR techniques that either transform the solutions and the related equations, within the Arbitrary Lagrangian–Eulerian framework, or with nonlinear techniques like convolutional autoencoders and graph neural networks.

Part VIII – Selected Talks and Organization of Schools

Talks as Invited Speaker

Conference	Place	Year	Talk
Seminar on Lattice Boltzmann methods	Poincaré Institute, Paris, France	2019	High order asymptotic preserving IMEX residual distribution scheme for kinetic models
International Congress on Industrial and Applied Mathematics (ICIAM)	Valencia, Spain	2019	Model order reduction for advection dominated problems
SAMinar	ETH, Zurich, Switzerland	2020	ADER and DeC: Arbitrarily High Order Explicit Time Integration Methods
AJS Seminar	SISSA, Trieste, Italy	2020	Model Reduction for Advection Dominated Hyperbolic Problems in an ALE Framework: Offline and Online Phases
Workshop on Hyperbolic Balance Laws	Oberwohlfach, Germany	2021	ADER and DeC: Arbitrarily High Order Explicit Methods for hyperbolic PDEs and ODEs
International Conference on Spectral and High Order Methods (ICOSAHOM 2020)	Vienna, Austria (online)	2021	On modified Patankar schemes and oscillations: towards new stability definitions
Computation of hyperbolic and related PDEs: A conference in honor of Remi Abgrall	Ascona, Switzerland	2022	A new efficient explicit deferred correction framework: analysis and applications to hyperbolic PDEs and adaptivity
PDE Afternoon	Vienna University and TU Wien, Austria	2023	Model order reduction for advection dominated (hyperbolic) problems in an ALE framework

Selected Talks

Conference	Place	Year	Talk
Numerical Methods for Hyperbolic Problems	Trento, Italy	2021	Continuous Galerkin high order well–balanced discrete kinetic model for shallow water equations
European Workshop on High Order Nonlinear Numerical Methods for Evolutionary PDEs: Theory and Applications	Braga, Portugal	2022	Arbitrary high order positivity-preserving finite volume shallow water scheme without restrictions on the CFL
Model Reduction and Surrogate Modeling (MORE)	Berlin, Germany	2022	Model order reduction for Friedrichs' systems: a bridge between elliptic and hyperbolic problems
Sharing Higher–Order Advanced Know-how on Finite Volume (SHARK-FV)	Minho, Portugal	2023	Global Flux WENO finite volume and other structure preserving schemes for water equations

Lectures in research schools

Research School	Place	Year	Lesson

Summer School on Reduced Order Methods in Computational Fluid Dynamics	SISSA, Trieste, Italy	2022	Weighted model order reduction techniques and tutorials with RBniCS library
Nottingham LMS Research School on Adaptive Methods and Model Order Reduction	Nottingham, UK	2023	Certified reduced basis methods for parametric PDEs: tutorials with RBniCS library

Organization of summer school

Research School	Place	Year	Duties
Summer School on Reduced Order Methods in Computational Fluid Dynamics	SISSA, Trieste, Italy	2022	Part of the local committee, organizing the school and delivering lectures.

Part IX – Summary of Scientific Achievements

Product type	Number	Data Base	Start	End
Papers [international]	13	Scopus	2018	2023
Chapter in book [scientific]	1	Scopus	2019	2019

Total Impact factor	35.9
Average Impact Factor	2.76
Total Citations	70
Average Citations per Product	5.0
Hirsch (H) index	5
Normalized H index*	0.833

*H index divided by the academic seniority.

Part X– Selected Publications

1. Davide Torlo, and Mario Ricchiuto. Model order reduction strategies for weakly dispersive waves. MATHEMATICS AND COMPUTERS IN SIMULATION, 205, pp. 997–1028, 2023, IF 3.601, Citations 0, doi:10.1016/j.matcom.2022.10.034, scopus eid:2-s2.0-85144049084.
2. Sixtine Michel, Davide Torlo, Mario Ricchiuto, Rémi Abgrall. Spectral Analysis of High Order Continuous FEM for Hyperbolic PDEs on Triangular Meshes: Influence of Approximation, Stabilization, and Time-Stepping. Journal of Scientific Computing, 94(3), 49, 2023. IF 2.843, Citations 0, doi:10.1007/s10915-022-02087-0, scopus eid:2-s2.0-85146661934.
3. Elena Gaburro, Philipp Öffner, Mario Ricchiuto, and Davide Torlo. High order entropy preserving ADER-DG schemes. Applied Mathematics and Computation, 440, 127644, 2022. IF 4,397, Citations 4, doi:10.1016/j.amc.2022.127644, scopus eid:2-s2.0-85140884093.
4. Davide Torlo, Philipp Öffner, and Hendrik Ranocha. Issues with positivity-preserving Patankar-type schemes. Applied Numerical Mathematics, 182, pp. 117–147, 2022. IF 2.994, Citations 2, doi:10.1016/j.apnum.2022.07.014, scopus eid:2-s2.0-85135957395.
5. Mirco Ciallella, Lorenzo Micalizzi, Philipp Öffner, and Davide Torlo. An arbitrary high order and positivity preserving method for the shallow water equations. Computers & Fluids, 247, 105630, 2022. IF 3.077, Citations 1, doi:10.1016/j.compfluid.2022.105630, scopus eid:2-s2.0-85137176860.

6. Sixtine Michel, Davide Torlo, Mario Ricchiuto, and Rémi Abgrall. Spectral analysis of continuous FEM for hyperbolic PDEs: influence of approximation, stabilization, and time-stepping. Journal of Scientific Computing, 89(2), 31, 2021. IF 2.843, Citations 4, doi:10.1007/s10915-021-01632-7, scopus eid:2-s2.0-85115265895.
7. Rémi Abgrall, Élise Le Mélédo, Philipp Öffner, and Davide Torlo. Relaxation Deferred Correction Methods and their Applications to Residual Distribution Schemes. The SMAI Journal of computational mathematics, 8, pp. 125–160, 2021. IF 1.129, Citations 3, doi:10.5802/smai-jcm.82, scopus eid:2-s2.0-85140872916.
8. Maria Han Veiga, Philipp Öffner, and Davide Torlo. Dec and Ader: similarities, differences and a unified framework. Journal of Scientific Computing, 87(1), 2, 2021. IF 2.843, Citations 8, doi:10.1007/s10915-020-01397-5, scopus eid:2-s2.0-85101007478.
9. Rémi Abgrall and Davide Torlo. High order asymptotic preserving deferred correction implicit-explicit schemes for kinetic models. SIAM Journal on Scientific Computing, 42(3), pp. B816–B845, 2020. IF 2.968, Citations 12, doi:10.1137/19M128973X, scopus eid:2-s2.0-85090133969.
10. Philipp Öffner and Davide Torlo. Arbitrary high-order, conservative and positivity preserving Patankar-type deferred correction schemes. Applied Numerical Mathematics, 153, pp. 15–34, 2020. IF 2.994, Citations 15, doi:10.1016/j.apnum.2020.01.025, scopus eid:2-s2.0-85079043394.
11. Davide Torlo, Francesco Ballarin, and Gianluigi Rozza. Stabilized weighted reduced basis methods for parametrized advection dominated problems with random inputs. SIAM/ASA Journal on Uncertainty Quantification, 6(4), pp. 1475–1502, 2018. IF 2.089, Citations 10, doi:10.1137/17M1163517, scopus eid:2-s2.0-85058246502.
12. Roxana Crisovan, Davide Torlo, Rémi Abgrall, and Svetlana Tokareva. Model order reduction for parametrized nonlinear hyperbolic problems as an application to uncertainty quantification. Journal of Computational and Applied Mathematics, 348, pp. 466–489, 2018. IF 2.872, Citations 10, doi:10.1016/j.cam.2018.09.018, scopus eid:2-s2.0-85054171472.