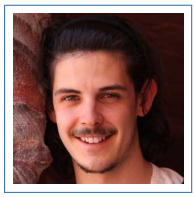

Davide Torlo

Curriculum Vitae

Personal Information

Date of birth 7/12/1992

Nationality Italian

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Scholar Google Scholar link

Education

Sep. 2016 – Jun. 2020 **PhD in Mathematics (expected on 2nd June 2020)**, *University of Zurich (UZH)*, Switzerland.

Supervisor: Prof. Rémi Abgrall.

Thesis title: *Hyperbolic Problems: High Order Methods and Model Order Reduction*.

Student of the Zurich Graduate School in Mathematics. Attending courses on advanced topics of Numerical Analysis, Image Analysis, Computational Statistics, Machine Learning and Theoretical Partial Differential Equations.

- Developed high order accurate numerical schemes for kinetic hyperbolic systems of PDEs and applied to shallow water and Euler equations.
- Developed the modified Patankar deferred correction method, a positive and conservative arbitrary high order accurate time integration method.
- Studied the stability of the deferred correction method with residual distributions space discretization on kinetic problems.
- Developed a model order reduction (MOR) algorithm for hyperbolic problems and tested it for UQ.
- Developed a MOR technique for arbitrary Lagrangian–Eulerian framework for specific advection dominated problems.

Sep. 2014 – Jul. 2016 **M.Sc. in Mathematics 110 cum laude/110**, *Università degli Studi di Trieste & International School for Advanced Studies (SISSA)*, Italy.

Attending SISSA program courses as Functional Analysis, Differential Geometry, Algebraic Geometry, Physical Mathematics, Numerical Analysis, Optimization and Computational Statistics.

Thesis title: *Stabilized reduced basis method for transport PDEs with random inputs*.

Supervisor: Prof. Gianluigi Rozza.

Awarded with the SISSA Scholarship for Master Degree.

- Introduced a linear stabilization method in a MOR technique.
- Studied a selective stabilization of advection dominated problems for UQ applications.

Opt. 2011 – Jul. 2014 **B.Sc. in Mathematics 110 cum laude/110**, *Università degli Studi di Milano–Bicocca*, Italy.

Thesis title: *Il Teorema di Fritz John: tre differenti approcci*.

Supervisor: Prof.ssa Rita Pini.

Awarded with the INDAM Scholarship for Bachelor Degree based on a national test.

Publications and other works

Publications

2020 P. Öffner and D. Torlo. Arbitrary high-order, conservative and positivity preserving Patankar–type deferred correction schemes. *Applied Numerical Mathematics*, 153:15 – 34, 2020. https://doi.org/10.1016/j.apnum.2020.01.025

2019 R. Crisovan, D. Torlo, R. Abgrall, and S. Tokareva. Model order reduction for parametrized nonlinear hyperbolic problems as an application to uncertainty quantification. *Journal of Computational and Applied Mathematics*, 348:466 – 489, 2019. https://doi.org/10.1016/j.cam.2018.09.018

2018 D. Torlo, F. Ballarin, and G. Rozza. Stabilized weighted reduced basis methods for parametrized advection dominated problems with random inputs. *SIAM/ASA Journal on Uncertainty Quantification*, 6(4):1475–1502, 2018. https://epubs.siam.org/doi/pdf/10.1137/17M1163517

2019 L. Venturi, D. Torlo, F. Ballarin, and G. Rozza. Weighted reduced order methods for parametrized partial differential equations with random inputs. In Flavio Canavero, editor, *Uncertainty Modeling for Engineering Applications*, chapter 2, pages 27–40. Springer International Publishing, 2019. https://arxiv.org/abs/1805.00828

Preprints

2018 R. Abgrall and D. Torlo. Asymptotic preserving deferred correction residual distribution schemes. *arXiv e-prints*, arXiv:1811.09284, 2018. https://arxiv.org/abs/1811.09284

2019 R. Abgrall and D. Torlo. Some preliminary results on a kinetic scheme that has a Lattice Boltzmann method flavour. *arXiv e-prints*, page arXiv:1904.12928, 2019. https://arxiv.org/abs/1904.12928

2020 M. Han Veiga, P. Öffner and D. Torlo. DeC and ADER: Similarities, Differences and a Unified Framework. *arXiv e-prints*, arXiv:2002.11764, 2020. https://arxiv.org/abs/2002.11764

2020 D. Torlo. Model reduction for advection dominated hyperbolic problems in an ALE framework: offline and online phases. *arXiv e-prints*, arXiv:2003.13735,2020. https://arxiv.org/abs/2003.13735

Works in preparation

2020 S. Kopecz, P. Öffner, H. Ranocha and D. Torlo. Stability of Patankar-Type schemes. *(in preparation)*, 2020.

2020 D. Torlo and M. Ricchiuto. Well-balanced discrete kinetic shallow water approximations on high order continuous finite elements. *(in preparation)*, 2020.

2020 S. Michel, D. Torlo, M. Ricchiuto and R. Abgrall. On the stability of many finite element schemes with different stabilizations and time integrations. *(in preparation)*, 2020.

Teaching Experience

Teaching assistant and instructor at the University of Zurich, During my PhD I have taught every semester a course to classes of 20-70 Bachelor and/or Master students from Mathematics, Computer Science and Natural Science. I have been both teaching assistant and instructor of several courses. During these courses I have written and corrected exercise sheets, I have prepared, examined and corrected exams of the taught courses, of *Programming in Python* and of *Mathematics for Natural Science*.

2020 **Numerical Methods for Hyperbolic PDEs**, *Teaching Assistant*, 20 Bachelor, Master and PhD students of Mathematics.

2019 **Numerical Methods for Computer Science**, *Teaching Assistant*, 50 Master and Bachelor students of Computer Science and Natural Science.

2019 **Seminar in Modeling in Classical Continuum Mechanics for Fluids and Solids**, *Teaching assistant*, 5 students from Mathematics.

2019 **Programming in MATLAB**, *Instructor*, 70 Bachelor students from Mathematics.

2018 **Programming in MATLAB**, *Instructor*, 50 Bachelor students from Mathematics.

2017 **Analysis 1**, *Teaching assistant*, 20 Bachelor students from Mathematics.

2017 **Numerical Analysis 1**, *Teaching assistant*, 20 Bachelor students from Mathematics.

2016 **Numerical methods for advection dominated problems**, *Teaching assistant*, 10 Master and PhD students from Mathematics.

International Talks

Invited Talks

Jul. 2019 **ICIAM 2019**, *Valencia, Spain*, presenting "Model order reduction for advection dominated problems".

May 2019 **Seminar on Lattice Boltzmann methods**, *Henri Poincaré Institute, Paris, France*, "High order asymptotic preserving IMEX residual distribution scheme for kinetic model".

Selected Contributions in Conferences

Sep. 2019 **MultiMat 2019**, *Trento, Italy*, Poster on "High order IMEX DeC RD for Baer–Nunziato 7 equations model".

Apr. 2019 **Honom**, *Madrid, Spain*, "High order residual distribution methods for stiff problems".

Feb. 2019 **SIAM CSE19**, *Spokane, WA, USA*, "Model order reduction for hyperbolic problems".

Jun. 2018 **HYP2018**, *University Park, PA, USA*, "Asymptotic Preserving relaxation method for RD schemes".

Jun. 2018 **ECCM–ECFD**, *Glasgow, UK*, "Asymptotic Preserving relaxation method for RD schemes".

May 2017 **NumHyp 2017**, *Ascona, Switzerland*, "Asymptotic Preserving Deferred Correction Residual Distribution schemes".

Workshops

Nov. 2019 **High performance computing with Python**, *CSCS, Lugano, Switzerland*.

Jul. 2019 **Summer School on "Reduced order methods in computational fluid dynamics"**, *SISSA, Trieste, Italy*.

Feb. 2018 **Workshop on "Numerical and physical modelling in multiphase flows: a cross-fertilisation approach"**, *Paris, France*.

Mar. 2017 **Spring School on "Multiscale Modeling"**, *Aachen, Germany*.

Dec. 2016 **Workshop on "Modeling and Computation of Shocks and Interfaces"**, *Paris, France*.

Research Visits

Jun. 2019 **INRIA**, *Bordeaux, France*, hosted by prof. Mario Ricchiuto.
Topic: Kinetic schemes for shallow water equations

Jun. 2018 **University of Catania**, *Italy*, hosted by prof. Giovanni Russo.
Topic: Implicit–Explicit Runge Kutta Deferred Correction algorithms

Awards, Scholarships and Competitions

2014–2016 **SISSA Scholarship for Master Degree**, *SISSA, Trieste*.

2011–2014 **INDAM Scholarship for Bachelor Degree**, 5° national position.

2011 **Premio Banca d'Italia per l'eccellenza negli studi matematici**.

2008–2013 **Partecipant and winner of various mathematical games, both individually and as part of a team**, *Italian Mathematic Olimpics Game, Kangarou della Matematica, Gara di Matematica Applicata, Giochi Matematici Bocconi*.

Members in panels

2017–now **Reviewer** for the *Journal of Computational Physics*.

2015–now **Member** of the Society for Industrial and Applied Mathematics (SIAM).

2015–2016 **Member** of the SISSA SIAM Student Chapter.

Extracurricular Experience

2017–now **Reviewer** for the *Journal of Computational Physics*.

2010–2016 **Private teacher** for High School and University students.

2015–2016 **Lecturer of "Music and Mathematics" for High Schools**.

2015–2016 **Theatrical technician**, at *TACT International Act Festival Trieste*.

2011–2014 **Theatrical technician**, at *Auditorium via Alberico da Rosciate, Bergamo*.

Community Service

2015 **Oxfam volunteer**, Christmas Oxfam project in Trieste.

2014–2016 **Faculty Students' Representative**, Università degli Studi di Trieste.

2013–2016 **Organizer** of *Bergamo Beatles festival*.

2010–2011 **High School Students' Representative**, Liceo Scientifico Mascheroni, Bergamo.

2010–2014 **Active member** of *Associazione Giovanile Mellow Mood*.

2005–2016 **Volunteer** as theatrical technician, light designer, sound engineer and cinema operator, *Teatro Qoelet di Redona*, Bergamo.

Skills

Programming Python (parallel computing, tensorflows, keras), Fortran, Matlab, Julia (parallel computing)

Languages Italian (Native), English (C1 TOEFL 100/120), German B2

Hobbies

2014-2016 **Theater Course with CUT Association**, Trieste.

2002- now **Music**, *Guitar and piano player in bands (amateur level)*.