CURRICULUM VITAE (20.4.2024)

• Personal information.

Name: Siddhartha Mishra
Date of Birth: 05-05-1980.
Citizenship: Indian.
Webpage: https://camlab.ethz.ch/the-group/group-head.html
Lab Webpage: https://camlab.ethz.ch

• Education.

September 2005:	Ph.D in Mathematics, Indian Institute of Science (IISc)- Tata Institute of Fundamental Research (TIFR), Bangalore India.
June 2003:	M. S. in Mathematical Sciences,IISc-TIFR, Bangalore India. *Certificate for outstanding Masters thesis.*
June 2000:	B. Sc (Hons) in Mathematics and Physics, Utkal University, Bhubaneswar, India. *Governor's Gold medal*

• Professional Career.

2015 - :	Chair Professor for Applied Mathematics, ETH Zurich, Switzerland.
2012- 2015:	Associate Professor for Applied Mathematics, ETH Zurich, Switzerland.
2012-:	Professor II, Mathematics Institute. University of Oslo, Norway.
2011-2012:	Associate Professor, CMA, University of Oslo, Norway.
2009-2011:	Assistant Professor, ETH Zurich, Switzerland.
2005-2009:	Postdoctoral researcher, CMA, University of Oslo, Norway.

• Professional Responsibilities.

2012-:	Head, Computational and Applied Mathematics Laboratory (CamLab), ETH Zurich.
2021- :	Director, Computational Science Zurich.
2021-:	Core Faculty, ETH AI Center.
2021-2023:	Program Director, SIAM Activity group on Analysis of PDEs (SIAG APDE).
2023-:	Vice President, ETH Research Commission.
2020-:	Member, ETH Research Commission.
2020-:	Member, ETH Informatics Commission.
2021-:	Member, Executive Board, D-MATH, ETH Zurich.
2023-:	Member, ETH Tenure Committee.
2024-:	Area Lead (Climate and Sustainability), Swiss AI initiative.

• Research interests.

▷ Numerical analysis, Scientific Computing, Nonlinear PDEs, Machine learning and AI, Applications to: Fluid dynamics, Plasma physics, Geophysics, Climate Science, Biology.

• Awards and Honors.

2023	*Rössler Prize*, ETH Zurich
2022	*Germund Dahlquist Prize*, SIAM
2019	*Infosys Prize in Mathematical Sciences*, Infosys Science Foundation.
2019	*Collatz Prize*, ICIAM.
2018	*Jacques Louis Lions medal*, ECCOMAS.
2018	*ERC Consolidator Grant*, European Research Council.
2018	*Invited Speaker*, International Congress of Mathematicians (ICM), Rio de Janiero.
2015	*Richard von Mises prize*, GAMM.
2012	*ERC Starting Grant*, European Research Council
2012	*Plenary Speaker*, 14th Int. Conf. Hyp. Problems, Padova.

- **Selected Funding.**

2010-2013	ETH- CHIRP II research grant (600K CHF)
2012-2017	ERC Starting grant *SPARCCLE* (1.2 M Euros).
2012-2015	Swiss SNF research grant, 150K CHF
2014-2017	Airbus Industries, 50K CHF
2015-2019	ERC-ITN *ModCompShock* 4 M Euros , *Assistant Coordinator of Network*
2017-2020	Swiss SNF research grant, 150K CHF
2018-2023	ERC Consolidator grant *COMANFLO* (2.0 M Euros).
2024-2025	Google Gift, 60K USD.

- **Supervision of PhD students.**

Paolo Corti	ETH	2009-2012	Curr: Actuary, Generali, Bern.
Ulrik S. Fjordholm	ETH	2009-2013	Curr: Full Professor, University of Oslo.
Jonas Sukys	ETH	2011-2014	Curr: Group Leader, EAWAG, Switzerland.
Andreas Hiltebrand	ETH	2011-2014	Curr: Snr. Software Developer, ANSYS.
Filippo Leonardi	ETH	2014-2018	Curr: Software Developer, Urban Games.
Kjetil Lye	ETH	2014-2020	Curr: Senior Researcher, SINTEF, Oslo.
Carlos Pares Pulido	ETH	2016-2021	Curr: Consultant, D-one, Zurich
Soumil Gurjar	ETH	2016-2023	Curr: Consultant, D-one, Zurich
Luc Grosheintz	ETH	2017-2021	Curr: HPC Research Engineer, Blue Brain Project,
Samuel Lanthaler	ETH	2018-2021	Curr: Postdoc, CMS, Caltech.
Marco Petrella	ETH	2018-2022	Curr: Consultant D-one, Zurich
Konstantin Rusch	ETH	2019-2023	Curr: Postdoc, CSAIL, MIT
Roberto Molinaro	ETH	2019-2023	Curr: Research Scientist, Jua.ai
Tim DeRyck	ETH	2020-2024	ongoing
Tobias Rohner	ETH	2022-2025	ongoing
Victor Armegioiu	ETH	2022-2025	ongoing
Bogdan Raonic	ETH AI center	2023-2027	ongoing

- **Co-supervision of PhD students.**

Franz Fuchs (U. Oslo)	2006-2009	Curr: Snr Research Scientist, SINTEF, Oslo.
Ujjwal Koley (U. Oslo)	2007-2010	Curr: Associate Professor, TIFR, Bangalore.
Svetlana Tokareva (ETH)	2010-2013	Curr: Research Scientist, Los Alamos NL, U.S.A.
Cecilia Pagliantini (ETH)	2012-2016	Curr: Assistant Professor, TU Eindoven, NL
Deep Ray (TIFR)	2013-2017	Curr: Assistant Professor, U Maryland, USA.
Gioelle Jannet (ETH)	2015-2019	Curr: High school Teacher, Bellinzona, Switzerland.
Pratyuksh Bansal (ETH)	2017-2021	Curr: Engineer, Supercomputing systems CH.
Mike Yan Michelis (ETH AI center)	2022-2025	ongoing
Langwen Huang (ETH D-INFK)	2022-2025	ongoing
Mostafa Kiani (ETH D-BAUG)	2021-2024	ongoing
Dana Grund (ETH D-USYS)	2023-2027	ongoing
David Graber (ZHAW)	2023-2027	ongoing

- **Mentoring of Postdocs.**

Harish Kumar	ETH	2009-2011	Curr: Associate Professor, IIT Delhi, India
Roger Käppeli	ETH	2011-2015	Curr: Senior Scientist, ETH Zürich.
Sandra May	ETH	2013-2016	Curr: Assistant Professor, TU Dortmund
Alexandra Landsman	ETH	2014-2016	Curr: Associate Professor, OSU, USA.
Franziska Weber	ETH	2015-2016	Curr: Assistant Professor, UC Berkeley, USA.
Adrian Ruf	ETH	2020- 2022	Curr: Postdoc, University of Oslo, Norway.
Benjamin Scellier	ETH	2021-2022	Curr: Staff Scientist, Rain Neuromorphic, USA.
Emmanuel DeBezenac	ETH FDS	2022-2024	ongoing
Benjamin Moseley	ETH AI Center	2022-2024	ongoing
Georgios Kissas	ETH AI Center	2023-2025	ongoing

- **Development of Scientific Software (Team leader):**

▷ *ALSVID* (massively parallel large scale 3-D Euler and MHD solver).
▷ *SURYA* (massively parallel multi-physics simulator of the outer solar atmosphere).
▷ *ALSVID-UQ* (Uncertainty quantification module for multi-D conservation and balance laws).
▷ *DGJAC* (Discontinuous Galerkin solver for multi-D conservation laws on unstructured grids).
▷ *ALSVINN* (Highly scalable UQ module for multi-D conservation laws on GPUs)
▷ *SPHINX* (Massively parallel Finite difference-projection solver for incompressible Euler flows)
▷ *TENSUM* (Parallel Solver for Euler and Navier-Stokes equations on unstructured grids.).
▷ *TYR* (GPU optimized dynamical core for exoplanetary climate simulations)
▷ *AZEBAN* (Highly scalable Incompressible Navier-Stokes Solver on GPUs)

- **Participation in research networks.**

▷ *Node in charge*, KI-NET, U.S. NSF research network, 2015-2019
▷ *Assistant coordinator*, European Research Network (**ITN**) *ModCompShock*: modeling and computation of shocks and interfaces, 2015- 2019.

Editorial Work:

▷ Associate editor of *Acta Numerica*.
▷ Associate editor of *SINUM* (SIAM journal on Numerical Analysis)
▷ Associate editor of *SISC* (SIAM journal on Scientific Computing)
▷ Associate editor of *ZAMP* (Journal of Applied Mathematics and Physics) (2010-2023)
▷ Associate editor of *CACM* (Computational Astrophysics and Cosmology) (2014-2017)
▷ Associate editor of *CMS* (Communications in Mathematical Sciences).
▷ Senior editor of *TrMA* (Transactions in Mathematics and Applications).
▷ Associate editor of *IMAJNA* (IMA Journal of numerical analysis),
▷ Associate editor of *DCDS* (Discrete and Continuous Dynamical systems) (2014-2020)
▷ Section editor of *PDEA* (Springer Nature PDEs and applications).
▷ Associate editor of *MinE* (Mathematics in Engineering).
▷ Associate editor of *CAMS* (Communications of AMS).
▷ Associate editor of *ACOM* (Advances in Computational Mathematics).

- **Selected plenary/Invited conference talks**

▷ *3rd Intl. conf. on structure preserving discretizations of PDEs*, Oslo, June 2009.
▷ *13th Intl. Conf. on Hyperbolic problems*, Beijing, June 2010.
▷ *Modeling and computations of shallow water coastal flows*, College Park, October 2010.
▷ *Int. Conf on numerical methods for stochastic PDEs,* Bonn, August 2011.
▷ *14th Intl. Conf. on Hyperbolic problems*, Padova, June 2012.
▷ *International conference on Applied Mathematics*, Heraklion, Sept. 2013.
▷ *Modern perspectives in Applied Mathematics*, Washington, April 2014.
▷ *SciPDE 14*, Hongkong, December 2014.
▷ *UMRIDA conference on UQ*, Delft, April 2015.
▷ *NUMHYP*, Cortona, June 2015.
▷ *Multiscale methods in PDEs*, Rennes, August 2015.
▷ *NAPDE*, Warwick, April 2017.
▷ *Finite Volumes for complex applications*, Lille, June, 2017.
▷ *NUMASP*, Ferrara, April 2018.
▷ *ICM*, Rio De Janiero, August 2018.
▷ *Front UQ*, Pisa, September 2019.
▷ *ENUMATH*, Egmund aan zee, September 2019.
▷ *ICOSAHOM*, Vienna, July 2021.
▷ *Indian Mathematical Society Congress*, Online, December 2021.
▷ *SCICADE*, Rekjavik, July 2022.
▷ *MSML*, Providence, June 2023.

▷ *SIAM Annual Meeting*, Spokane, July 2024.

- **Teaching activities.**

▷ Taught 39 courses at both undergraduate and graduate level at ETH and U. Oslo.
▷ Supervised 69 Masters and Bachelors thesis (4 ETH medals for outstanding Msc thesis + 3 Polya prizes).

- **Development of Course Material: Lecture Notes, Exercises, Codes.**

▷ *Numerical Methods for Hyperbolic PDEs.* (for Math and Computational Science).
▷ *Computational Methods in Engineering.* (for Mechanical and Civil Engineering).
▷ *Mathematical and Computational Fluid Dynamics.* (for Math and Engineering).
▷ *AI in Sciences and Engineering.* (for Math, Science and Engineering).

PUBLICATIONS

▷ 104 published journal papers.
▷ 2 edited books + 1 text book (under preparation).
▷ 12 Refereed conference proceedings in top AI/ML Venues (Neurips/ICML/ICLR)
▷ 10 preprints.
▷ *MathSciNet MR Author ID:* **771599**.
▷ *ORCID ID:* 0000-0002-2665-5385.
▷ *Google Scholar* page: https://scholar.google.com/citations?user=FmEqyNcAAAAJ&hl=e

• **Ten most significant publications.** (in chronological order)

[**1.**] Adimurthi, S. Mishra and G.D.V. Gowda, **Optimal Entropy solutions for conservation laws with discontinuous flux functions,** *Jl. Hyp. Diff. Eqns*, 787-838, 2 (4), 2005.

This paper was the first to show the existence of infinitely many L^1 stable semi-groups of solutions for conservation laws with discontinuous coefficients. It proposed concepts like interface connections and AB-entropy solutions, that are now standard in the field. It is one of the most cited papers in the journal till date

[**2.**] U.S. Fjordholm, S. Mishra and E. Tadmor, **ENO reconstruction and ENO interpolation are stable**, *Found. Comput. Math,* 13 (2), 2013, 139-159.

The ENO reconstruction (interpolation) procedure was designed in the mid 80's and was very successfully applied to CFD and image processing. This paper presented the first ever rigorous stability result for this procedure in 30 years by proving a subtle property that the jumps of the reconstructed polynomials (of any order and on any grid) at each cell interface are of the same sign as the jumps of the underlying cell averages (point values).

[**3.**] U.S. Fjordholm, S. Mishra and E. Tadmor, **Arbitrarily high order accurate entropy stable essentially non-oscillatory schemes for systems of conservation laws**, *SIAM Jl. Num. Anal,* 50(2), 2012, 544-573.

This paper constructed the first set of arbitrary high order entropy stable schemes for multi-dimensional systems of conservation laws by combining entropy conservative fluxes with proper numerical diffusion operators, based on ENO reconstruction (see [2]). Convergence was also shown to entropy solutions for scalar conservation laws and linear symmetrizable systems.

[**4.**] S. Mishra, Ch. Schwab and J. Sukys, **Multi-level Monte Carlo finite volume methods for nonlinear systems of conservation laws in multi-dimensions**, *Jl. Comput. Phys,* 231 (2012), no. 8, 3365-3388.

We proposed the multi-level Monte Carlo (MLMC) method for efficient uncertainty quantification (UQ) for systems of conservation laws in this paper. This method has been shown to be very robust in numerous contexts in CFD. It can handle a very large number of sources of uncertainty (10^6 in more recent papers) and has been applied in many different UQ problems such as acoustic wave propagation and simulations of tsunamis.

[**5.**] U. S. Fjordholm, R. Käppeli, S. Mishra and E. Tadmor, **Construction of approximate entropy measure valued solutions for hyperbolic systems of conservation laws**, *Found. Comput. Math.,* 17 (3), 2017, 763-827.

This paper proposed a novel Monte-Carlo ensemble averaging algorithm, based on structure preserving discretizations (such as [3.]) and showed that this algorithm converges to an entropy measure-valued solution of multi-dimensional systems of conservation laws. This was the first proof of convergence for any numerical approximations of such systems. Extensive computations also illustrated the theory and revealed interesting properties of measure-valued solutons.

[**6.**] K. G. Pressel, S. Mishra, T. Schneider, C. M. Kaul and Z. Tan, **Numerics and Subgrid-Scale Modeling in Large Eddy Simulations of Stratocumulus Clouds,** *Journal of Advances in Modeling Earth Systems (JAMES)*, 9 (2), 2017, 1342-1365..

In this paper, we derived and showed why an implicit large eddy simulation (ILES) with very-high order WENO schemes provides the best agreement with observations for the DYCOMS II case study for stratocumulus clouds.This was a lucid example of using rigorous numerical analysis and non-oscillatory schemes in an atmospheric sciences context.

[**7.**] U.S Fjordholm, K. O. Lye, S. Mishra and F. Weber, **Statistical solutions of hyperbolic systems of conservation laws: Numerical approximation**, *Math. Mod. Meth. Appl. Sci. (M3AS)* , 30 (3), 2020.

In this article, we developed the notions of statistical solutions (time-parameterized probability measures) for multi-dimensional systems of conservation laws, which adds (multi-point) correlations to measure-valued solutions and proves convergence of Monte Carlo finite volume schemes to these solutions .

[**8.**] K. O. Lye, S. Mishra and D. Ray, **Deep learning observables in computational fluid dynamics**, , *J. Comput. Phys.,*, 410, 109339, 2020.

This paper proposes a novel algorithm based on machine learning that learns the parameters to observable map for the nonlinear PDEs that govern fluid flows, with a few training samples. This is a striking example of the application of deep learning within the context of CFD. Moreover, the algorithms are applied in the context of UQ and provided an order of magnitude speedup over QMC methods and two orders of magnitude speed up with respect to Monte Carlo.

[**9.**] T. K. Rusch and S. Mishra, **Coupled Oscillatory Recurrent Neural Network (coRNN): An accurate and gradient stable architecture for learning long-time dependencies**, *International Conference on Learning Representations (ICLR), 2021 (***Orals***).* available from arXiv:2010.00951

In this paper, we propose a novel recurrent neural network (RNN) architecture based on networks of coupled damped oscillators and prove rigorously that the exploding and vanishing gradient problem (EVGP) is mitigated for this RNN. CoRNN provides state of the art (SOTA) performance on variety of learning tasks with long-time dependencies.

[**10.**] S. Lanthaler, S. Mishra and G. E. Karniadakis, **Error estimates for DeepOnets: A deep learning framework in infinite dimensions**, *Trans. Math. Appl.*., 2022, to appear, available form arXiv:2102.09618.

In this article, we prove rigorous error estimates for DeepOnets which has been established a very successful and effective framework for learning nonlinear operators on infinite-dimensional spaces, such as solutions of PDE, from data. We prove that DeepOnets can break the curse of dimensionality for a variety of PDEs of the elliptic, parabolic or hyperbolic type. Generalization error estimates for DeepOnets are also derived showing the mitigation of the curse of dimensionality in this context.

Complete list of Publications

Books

[**A1.**] *Uncertainty Quantification in Computational Fluid Dynamics.* ,H. Bijl, D. Lucor, S. Mishra, C. Schwab eds., Lecture Notes in Computational Science and Engineering Volume 92, 2013.

Journal articles.

[**B1.**] S. Mishra, Convergence of upwind difference schemes for a scalar conservation law with indefinite discontinuities in the flux function, *SIAM Jl. Num. Anal.*, 559 - 577, 43(2), 2005.

[**B2.**] Adimurthi, S. Mishra and G.D.V. Gowda, Optimal Entropy solutions for conservation laws with discontinuous flux functions, *Jl. Hyp. Diff. Eqns*, 787-838, 2 (4), 2005.

[**B3.**] Adimurthi, S. Mishra and G.D.V. Gowda, Conservation laws with flux functions discontinuous in the space variable-II: Convex- Concave fluxes and generalized entropy solutions, *Jl. Comp. Appl. Math,* 203 (2), 2007, 310-344.

[**B4.**] Adimurthi, S. Mishra and G.D.V. Gowda, Convergence of Godunov type schemes for conservation with spatially varying discontinuous flux functions , *Math. Comput*, 76, 2007, 1219-1242.

[**B5.**] Adimurthi, S. Mishra and G.D.V. Gowda, Existence and Stability of entropy solutions for conservation laws with discontinuous non-convex fluxes, *Net. Heter. Media,* 2 (1), 2007, 127-157.

[**B6.**] Adimurthi, S. Mishra and G.D.V. Gowda, Explicit Hopf-Lax type formulas for Hamilton-Jacobi equations and Conservation laws with discontinuous coefficients, *Jl. Diff. Eqns,* 24, 2007, 1-31.

[**B7.**] K . H. Karlsen, S. Mishra and N. H. Risebro, Semi-Godunov schemes for general triangular systems of conservation laws, *Journal of Engg Math,* 60, 2008, 337 - 349.

[**B8.**] K . H. Karlsen, S. Mishra and N. H. Risebro, Large time stepping schemes for balance equations, *Jornal of Engg. Math,* 60, 2008, 351 - 363.

[**B9.**] K . H. Karlsen, S. Mishra and N. H. Risebro, A new class of well-balanced schemes for conservation laws with source terms, *Math. Comput.,* 78 (265), 2009, 55-78.

[**B10.**] K . H. Karlsen, S. Mishra and N. H. Risebro, Convergence of finite volume schemes for triangular systems of conservation laws, *Numer. Math.,* 111 (4), 2009, 559-589.

[**B11.**] F.Fuchs, S. Mishra and N.H.Risebro, Splitting based finite volume schemes for the ideal MHD equations, *Jl. Comput. Phys.,* 228 (3), 2009, 641-660.

[**B12.**] G.M.Coclite, S. Mishra, K.H.Karlsen and N.H.Risebro, Convergence of vanishing viscosity approximations for a multi-dimensional triangular systems of conservation laws, *Boll. Unione. Mat. Ital,* 9 (2), 2009, 275 - 284.

[**B13.**] K . H. Karlsen, S. Mishra and N. H. Risebro, Semi-Godunov schemes for multi-phase flows in porous media, *Ap. Num. Math.*, 59 (9), 2009, 2322-2336.

[**B14.**] F.Fuchs, K. H. Karlsen, S. Mishra and N.H.Risebro, Stable upwind schemes for the magnetic induction equations, *M2AN. Math. Model. Num. Anal,* 43 (5), 825-852, 2009.

[B15.] M. Svärd and S. Mishra, A shock capturing technique for higher order finite difference schemes, *Jl. Sci. Comp,* 39 (3). 2009, 454-484.

[B16.] P. G. LeFloch and S. Mishra, Non-classical shocks and numerical kinetic relations for a model MHD system, *Act. Math. Sci.,* 29(6), 2009, 1684-1702.

[B17.] S. Mishra and J. Jaffre, On the upstream mobility flux scheme for two phase flows in a porous medium with changing rock types, *Comp. GeoSci.,* 14 (1), 2010, 105-124.

[B18.] G.M.Coclite, S. Mishra and N.H.Risebro, Convergence of an Engquist-Osher scheme for a multi-dimensional triangular systems of conservation laws, *Math. Comput.,* 79 (269), 71-94, 2010.

[B19.] S. Mishra and M. Svärd, On stability of numerical schemes via frozen coefficients and the magnetic induction equations, *BIT.,* 50 (1), 2010, 85-108.

[B20.] U.Koley, S. Mishra, N.H.Risebro and M. Svärd, Higher order finite difference schemes for the magnetic induction equations, *BIT.,* 49 (2), 375-395, 2009.

[B21.] F.Fuchs, A.McMurry, S. Mishra, N.H.Risebro and K.Waagan, Finite volume methods for wave propagation in stratified magneto-atmospheres, *Comm. Comput. Phys.,* 7 (3), 2010, 473-509.

[B22.] F.Fuchs, A.McMurry, S. Mishra, N.H.Risebro and K.Waagan, High-order Well-balanced finite volume schemes for simulating waves in stratified magneto-atmospheres, *Jl. Comput. Phys.,* 229 (11), 2010, 4033-4058.

[B23.] U.S. Fjordholm, S. Mishra and E. Tadmor, Energy preserving and energy stable schemes for the shallow water equations, *Proc. FoCM,.* London Math. Soc. lecture notes, 363, 2009, 93-139.

[B24.] M. Svärd and S. Mishra, Implicit-Explicit schemes for flow equations with stiff source terms, *Jl. Comp. Appl. Math,* 235 (6), 1564-1577, 2011.

[B25.] S. Mishra and E. Tadmor, Constraint preserving schemes using potential based fluxes-I: Multi-dimensional transport equations, *Comm. Comput. Phys,* 9, 2011, 688-710.

[B26.] S. Mishra and E. Tadmor, Constraint preserving schemes using potential based fluxes-II: Genuinely multi-dimensional schemes for systems of conservation laws, *SIAM Jl. Num. Anal.,* 49 (3), 2011, 1023-1045.

[B27.] U.S. Fjordholm, S. Mishra and E. Tadmor, Energy preserving and energy stable schemes for shallow water equations with bottom topography, *Jl. Comput. Phys,* 230, 2011, 5587-5609.

[B28.] F.Fuchs, A.McMurry, S. Mishra, N.H.Risebro and K.Waagan, Approximate Riemann solver based high-order finite volume schemes for the MHD equations in multi-dimensions, *Comm. Comput. Phys,* 9, 2011, 324-362.

[B29.] U.S. Fjordholm and S. Mishra, Vorticity preserving schemes for the shallow-water equations, *SIAM Jl. Sci. Comp,* 33 (2), 588-611, 2011.

[B30.] F.Fuchs, A.McMurry, S. Mishra and K.Waagan, Simulating waves in the upper so-

lar atmospherew with SURYA: A well-balanced high-order finite volume code, *Astrophysical Journal*,732 (2), 2011, 75.

[B31.] S. Mishra and E. Tadmor, Constraint preserving schemes using potential based fluxes-III: divergence preserving central schemes for MHD equations, *M2AN Math. Model. Num. Anal*,46, 2012, 661-680.

[B32.] S. Mishra and C. Schwab, Sparse tensor multi-level Monte Carlo finite volume methods for hyperbolic conservation laws with random initial data. *Math. Comput.*, 81(180), 1979-2018, 2012 .

[B33.] G.M.Coclite, K.H.Karlsen, S. Mishra and N.H.Risebro, A hyperbolic-elliptic model of two-phase flow in porous media- existence of entropy solutions, *Int. Jl. Num. Anal. Model.,* 9 (2012), no. 3, 562–583.

[B34.] U.S. Fjordholm and S. Mishra, Accurate Numerical discretizations of non-conservative hyperbolic systems, *M2AN Math. Model. Num. Anal,* 46, 187-206, 2012.

[B35.] U.S. Fjordholm, S. Mishra and E. Tadmor, Arbitrarily high order accurate entropy stable essentially non-oscillatory schemes for systems of conservation laws, *SIAM Jl. Num. Anal,* 50(2), 2012, 544-573.

[B36.] H. Kumar and S. Mishra, Entropy stable numerical schemes for two-fluid MHD equations, *Jl. Sci. Comp,* 52 (2012), no. 2, 401-425 .

[B37.] U.S. Fjordholm, S. Mishra and E. Tadmor, ENO reconstruction and ENO interpolation are stable, *Found. Comput. Math,* 13 (2), 2013, 139-159.

[B38.] S. Mishra, Ch. Schwab and J. Sukys, Multi-level Monte Carlo finite volume methods for nonlinear systems of conservation laws in multi-dimensions, *Jl. Comput. Phys,* 231 (2012), no. 8, 3365-3388

[B39]. P. Corti and S. Mishra, Stable finite difference schemes for the magnetic induction equation with Hall effect, *BIT Numerical Mathematics,* 52 (4), 2012, 905-932.

[B40]. M. Svärd and S. Mishra, Entropy stable scheme for initial-boundary-value-problems for conservation laws, *ZAMP,* 63 (6), 2012, 985-1003.

[B41.] M.J. Castro, U.S. Fjordholm, S. Mishra and C. Pares Entropy conservative and entropy stable schemes for non-conservative hyperbolic systems, *SIAM Jl. Num. Anal,* 51 (3), 2013, 1371-1391.

[B42.] S. Mishra, Ch. Schwab and J. Sukys Multi-level Monte Carlo finite volume methods for shallow water equations with uncertain topography in multi-dimensions, *SIAM Jl. Sci. Comput,* 34 (6), 2012, 761-784.

[B43.] U.Koley, S. Mishra, N.H.Risebro and M. Svärd, Higher order SBP-SAT schemes for magnetic induction equations with resistivity, *IMA Jl. Num. Anal.,* 32(3), 2012, 1173-1193.

[B44.] A. Hiltebrand and S. Mishra, Entropy stable shock capturing streamline diffusion space-time discontinuous Galerkin (DG) methods for systems of conservation laws, *Numer. Math,* 126 (1), 2014, 103-151.

[B45.] G.M. Coclite, L. Di Ruvo, J. Ernest and S. Mishra, Convergence of vanishing cap-

illarity approximations for scalar conservation laws with discontinuous fluxes, *Netw. Heterog. Media*, 8 (4), 2013, 969-984.

[B46.] R. Käppeli and S. Mishra, Well-balanced schemes for the Euler equations with gravitation, *J. Comput. Phys.,* 259, 2014, 199-219.

[B47.] G. M. Coclite, S. Mishra, N. H. Risebro and F. R. Weber, Analysis and Numerical approximation of Brinkmann regularization of two phase flows in porous media, *Comp. GeoSci.,* 18 (5), 2014, 637-659.

[B48.] P. LeFloch and S. Mishra, Numerical methods with controlled dissipation for small-scale dependent shocks *Acta Numerica*, 23, 2014, 743-816.

[B49.] I. Averbukh, D. Ben-Zvi, S. Mishra and N. Barkai, Scaling morphogen gradients during tissue growth by a cell division rule, *Development*, 141, 2014, 2150-2156..

[B50.] S. Mishra and L.V. Spinolo Accurate numerical schemes for approximating intitial-boundary value problems for systems of conservation laws , *Jl. Hyp. Diff. Eqns.,* 12 (1), 2015, 61-86.

[B51.] J. Ernest, P. LeFloch and S. Mishra, Schemes with Well controlled dissipation (WCD) I: Non-classical shock waves, *SIAM Jl. Num. Anal.,* 53 (1), 2015, 674-699.

[B52.] A. Hiltebrand and S. Mishra, Efficient pre conditioners for a shock capturing space-time discontinuous Galerkin method for systems of conservation laws, *Comm. Comput. Phys.,* 17 (2015), 1, 83-98

[B53.] C. Sanchez-Linares, M. de la asuncion, M. Castro, S. Mishra and J. Sukys, Multi-level Monte Carlo finite volume method for shallow water equations with uncertain parameters applied to landslides-generated tsunamis, *Appl. Math. Modeling*, 39 (23-24), 2015, 7211-7226.

[B54.] S. Lanthaler and S. Mishra, Computation of measure valued solutions for the incompressible Euler equations, *Math. Mod. Meth. Appl. Sci. (M3AS)*, 25 (2015), 11, 2043-2088.

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