# Physics-Informed Learning Machines Literature

# 455 Citations from my *Physics of Data* Obsidian vault

### Alfonso R. Reyes

#### 2025-08-04

## **Table of Contents**

Citation Bibliography - PhysicsOfData Vault	2
Categorization Summary	2
DataFrame Analysis	
Citation Bibliography	2
1. Physics-Informed Learning Machines, SciML, PINNs	3
2. Supporting Papers	52
Processing Summary	58

#### Citation Bibliography - PhysicsOfData Vault

**Total Citations Found: 455** 

**Categorization Summary** 

Scientific Machine Learning (Core): 404 papers

**Supporting Papers:** 51 papers

**DataFrame Analysis** 

**Year range:** 1915 - 2024

Citations with Git repositories: 151

**Complete Document Type Distribution:** 

• Paper: 393 • Book: 20 • Chapter: 5 • Slides: 6

• PhDThesis: 4 • MastersThesis: 1 • BScThesis: 2 • Patent: 1

• TechReport: 4 • Software: 9 • Video: 3 • Not Specified: 6

• Article : 1 citations

**Top 5 Document Types:** • Paper: 393 ( 86.4 %) • Book: 20 ( 4.4 %) • Software: 9 ( 2 %) • Slides: 6 ( 1.3 %) • Chapter: 5 ( 1.1 %)

#### **Citation Bibliography**

**Format:** lastname, lastname. year. *title.* journal. N pages. DOI: DOI url. Relevance: score. [Git Repo]. Refs: number.

### 1. Physics-Informed Learning Machines, SciML, PINNs

- Wang, Wang, Perdikaris. 2021. Learning the solution operator of parametric partial differential equations with physics-informed DeepONets. Science Advances. 29 Sep 2021. Vol 7, Issue 40. 9 pages. DOI: https://doi.org/10.1126/sciadv.abi8605. Relevance: 111.44. Git Repo. Refs: 74.
- 2. Yuan, Ni, Deng, Hao. 2022. *A-PINN: Auxiliary physics informed neural networks for forward and inverse problems of nonlinear integro-differential equations.* Journal of Computational Physics. 21 pages. DOI: https://doi.org/10.1016/j.jcp.2022.111260. Relevance: 87.43. Git Repo. Refs: 48.
- 3. Liu, Zhu, Lu, Sun, Wang. 2023. *Multi-resolution partial differential equations preserved learning framework for spatiotemporal dynamics*. Communication Physics. 19 pages. DOI: https://doi.org/10.1038/s42005-024-01521-z. Relevance: 82.47. Git Repo. Refs: 82.
- 4. Anumasa, Srijith. 2021. *Improving Robustness and Uncertainty Modelling in Neural Ordinary Differential Equations*. IEEE Explore. 9 pages. DOI: https://doi.org/10.48550/arXiv.2 112.12707. Relevance: 69.67. Git Repo. Refs: 28.
- Kong, Yamashita, Foggo, Yu. 2022. Dynamic Parameter Estimation with Physics-based Neural Ordinary Differential Equations. 5 pages. DOI: https://doi.org/10.1109/pesgm48719.202
   2.9916840. Relevance: 66.4. Refs: 20.
- 6. Jagtap, Karniadakis. 2020. Extended Physics-Informed Neural Networks (XPINNs): A Generalized Space-Time Domain Decomposition Based Deep Learning Framework for Nonlinear Partial Differential Equations. Communications in Computational Physics. Volume 28, Issue 5pp. 2002–2041. 6 pages. DOI: https://doi.org/10.4208/cicp.OA-2020-0164. Relevance: 63.33. Git Repo. Refs: 11.
- 7. Karniadakis, Kevrekidis, Lu, Perdikaris, Wang, Yang. 2021. *Physics-informed machine learning*. Nature Reviews Physics. 20 pages. DOI: https://doi.org/10.1038/s42254-021-00314-5. Relevance: 63.16. Git Repo. Refs: 206.
- 8. Champion, Lusch, Kutz, Brunton. 2019. Data-driven discovery of coordinates and govern-

- ing equations. Proc. Natl. Acad. Sci. U.S.A.116 (45) 22445-22451,. 7 pages. DOI: https://doi.org/10.1073/pnas.1906995116. Relevance: 62.29. Git Repo. Refs: 57.
- 9. Zhao, Ding, Prakash. 2023. *PINNsFormer: A Transformer-Based Framework For Physics-Informed Neural Networks*. cs> arXiv:2307.11833. 17 pages. DOI: https://arxiv.org/abs/23 07.11833v3. Relevance: 54.35. Refs: 46.
- 10. Yan, Du, Tan, Feng. 2020. *On Robustness of Neural Ordinary Differential Equations*. 15 pages. DOI: https://doi.org/10.48550/arXiv.1910.05513. Relevance: 53.33. Git Repo. Refs: 34.
- 11. Wang, Yang, Liu, Zhao, Liu, Wu, Banu, Chen. 2022. *Data-driven modeling of process, structure and property in additive manufacturing: A review and future directions.* Journal of Manufacturing Processes 77 (2022) 13–31. 19 pages. DOI: https://doi.org/10.1016/j.jmapro.2022.02.053. Relevance: 52.68. Git Repo. Refs: 169.
- 12. Finlay, Jacobsen, Oberman. 2020. *How to train your neural ODE: the world of Jacobian and kinetic regularization*. Accepted to ICML 2020. 11 pages. DOI: https://doi.org/10.48550/arXiv.2002.02798. Relevance: 52.45. Refs: 38.
- Cai, Mao, Wang, Yin, Karniadakis. 2021. Physics-informed neural networks (PINNs) for fluid mechanics: A review. ODE-Net. The Chinese Society of Theoretical and Applied Mechanics (CSTAM) 2020. 12 pages. DOI: https://doi.org/10.48550/arXiv.2105.09506. Relevance: 51.58. Refs: 59.
- Cai, Wang, Wang, Perdikaris, Karniadakis. 2021. Physics-Informed Neural Networks for Heat Transfer Problems. Journal of Heat Transfer 143(6).. 12 pages. DOI: https://doi.org/10 .1115/1.4050542. Relevance: 51.58. Refs: 59.
- 15. Liu, Xiao, Si, Cao, Kumar, Hsieh. 2019. *Neural SDE: Stabilizing Neural ODE Networks with Stochastic Noise*. 15 pages. DOI: https://doi.org/10.48550/arXiv.1906.02355. Relevance: 50.67. Git Repo. Refs: 23.
- 16. Lu, Meng, Mao, Karniadakis. 2019. *DeepXDE: A Deep Learning Library for Solving Differential Equations*. SIAM Review 63(1):208-228. 2 pages. DOI: https://doi.org/10.1137/19M1

- 274067. Relevance: 50.5. Git Repo. Refs: 1.
- 17. Psichogios, Ungar. 1992. A hybrid neural network-first principles approach to process modeling. AIChE J., 38: 1499-1511. 13 pages. DOI: https://doi.org/10.1002/aic.690381003. Relevance: 48.46. Refs: 31.
- 18. Arzani, Wang, D'Souza. 2021. *Uncovering near-wall blood flow from sparse data with physics-informed neural networks*. Physics of Fluids. 10 pages. DOI: https://doi.org/10.1063/5.0055600. Relevance: 47.8. Git Repo. Refs: 67.
- 19. Kim, Kim, Lee, Lee. 2021. *Knowledge Integration into deep learning in dynamical systems: an overview and taxonomy.* J Mech Sci Technol. 13 pages. DOI: https://doi.org/10.1007/s1 2206-021-0342-5. Relevance: 47.42. Refs: 72.
- Fang. 2021. A High-Efficient Hybrid Physics-Informed Neural Networks Based on Convolutional Neural Network. IEEE Trans Neural Netw Learn Syst. 2022 Oct;33(10):5514-5526. 13 pages. DOI: https://doi.org/10.1109/tnnls.2021.3070878. Relevance: 46.08. Git Repo. Refs: 34.
- 21. Rudy, Brunton, Proctor, Kutz. 2017. *Data-driven discovery of partial differential equations*. Science Advances. 26 Apr 2017. Vol 3, Issue 4.. 6 pages. DOI: https://doi.org/10.1126/sciadv.1602614. Relevance: 43.67. Git Repo. Refs: 50.
- 22. Laboratory. 2020. *PhILMs: Collaboratory on Mathematics and Physics-Informed Learning Machines for Multiscale and Multiphysics Problems.* 40 pages. DOI: NA. Relevance: 43.12. Git Repo. Refs: 68.
- 23. Chen, Sondak, Protopapas, Mattheakis, Liu, Agarwal, Giovanni. 2020. *NeuroDiffEq: A Python package for solving differential equations with neural networks*. Journal of Open Source Software, 5(46), 1931,. 3 pages. DOI: https://doi.org/10.21105/joss.01931. Relevance: 43. Git Repo. Refs: 10.
- 24. Bongard, Lipson. 2007. Automated reverse engineering of nonlinear dynamical systems.

  Proc Natl Acad Sci U S A. 2007 Jun 12;104(24):9943-8. 6 pages. DOI: https://doi.org/10.107
  3/pnas.0609476104. Relevance: 42.17. Refs: 49.

- 25. Falas, Konstantinou, Michael. 2020. *Physics-Informed Neural Networks for Securing Water Distribution Systems*. 4 pages. DOI: https://doi.org/10.48550/arXiv.2009.08842. Relevance: 41.5. Refs: 16.
- 26. Jagtap, Mao, Adams, Karniadakis. 2022. *Physics-informed neural networks for inverse problems in supersonic flows.* math>arXiv:2202.11821. 19 pages. DOI: https://doi.org/10.1016/j.jcp.2022.111402. Relevance: 41.32. Refs: 46.
- 27. Guo, You, Li, Tang, Li. 2016. Physics-Inspired Neural Networks for Efficient Device Compact Modeling. IEEE Journal on Exploratory Solid-State Computational Devices and Circuits. 6 pages. DOI: https://doi.org/10.1109/JXCDC.2016.2636161. Relevance: 40.67. Git Repo. Refs: 11.
- 28. Heiden, Millard, Coumans, Sheng, Sukhatme. 2021. *Neuralsim: Augmenting differentiable simulators with neural networks*. 2021 IEEE International Conference onRobotics and Automation (ICRA), IEEE, 2021, pp. 9474–9481.. 8 pages. DOI: https://doi.org/10.48550/arXiv.2011.04217. Relevance: 40.25. Git Repo. Refs: 64.
- 29. Xujiao, Andy, Albert, Shahed. 2020. *Physics-Informed Graph Neural Network for Circuit Compact Model Development*. Conference: Physics-Informed Graph Neural Network for Circuit Compact Model Development.. 4 pages. DOI: http://dx.doi.org/10.23919/SISPAD 49475.2020.9241634. Relevance: 40. Refs: 13.
- 30. Yu, Swaminathan, Ji, White. 2017. *A method for creating behavioral models of oscillators using augmented neural networks.* 2017 IEEE 26th Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS). 3 pages. DOI: https://doi.org/10.1109/EPEP S.2017.8329714. Relevance: 40. Refs: 7.
- 31. Adeli. 2001. *Neural Networks in Civil Engineering: 1989–2000.* Comput. Aided Civ. Inf. Eng.. 17 pages. DOI: https://doi.org/10.1111/0885-9507.00219. Relevance: 39.59. Refs: 219.
- 32. Zhang, Yao, Gholami, Keutzer, Gonzalez, Biros, Mahoney. 2019. *ANODEV2: A Coupled Neural ODE Evolution Framework*. NeurIPS 2019 Workshop. 14 pages. DOI: https://doi.org/10.48550/arXiv.1906.04596. Relevance: 39.29. Refs: 25.

- 33. Meng, Li, Zhang, Karniadakis. 2019. *PPINN: Parareal Physics-Informed Neural Network for time-dependent PDEs.* Computer Methods in Applied Mechanics and Engineering. Volume. 17 pages. DOI: https://doi.org/10.1016/j.cma.2020.113250. Relevance: 39.06. Refs: 25.
- 34. Kidger, Morrill, Foster, Lyons. 2020. *Neural Controlled Differential Equations for Irregular Time Series*. Advances in Neural Information Processing Systems 33 (NeurIPS 2020). 12 pages. DOI: https://doi.org/10.48550/arXiv.2005.08926. Relevance: 38.67. Git Repo. Refs: 74.
- 35. Sun, Gao, Pan, Wang. 2019. Surrogate Modeling for Fluid Flows Based on Physics-Constrained Deep Learning Without Simulation Data. Computer Methods in Applied Mechanics and Engineering. 56 pages. DOI: https://doi.org/10.1016/j.cma.2019.112732. Relevance: 37.76. Git Repo. Refs: 79.
- 36. Lettermann, Jurado, Betz, Wörgötter, Herzog. 2024. *Tutorial: a beginner's guide to building a representative model of dynamical systems using the adjoint method.* Communications Physics volume 7, Article number: 128 (2024). 14 pages. DOI: https://doi.org/10.1038/s42005-024-01606-9. Relevance: 37.21. Git Repo. Refs: 99.
- 37. Laboratory. 2021. *PhILMS: Collaboratory on Mathematics and Physics-Informed Learning Machines for Multiscale and Multiphysics Problems.* October 2021. 47 pages. DOI: NA. Relevance: 37.11. Git Repo. Refs: 63.
- 38. Rubanova, Chen, Duvenaud. 2019. *Latent ODEs for Irregularly-Sampled Time Series*. 21 pages. DOI: https://doi.org/10.48550/arXiv.1907.03907. Relevance: 37.05. Git Repo. Refs: 18.
- 39. Butler, Davies, Cartwright, Isayev, Walsh. 2018. *Machine learning for molecular and materials science*. Nature. 10 pages. DOI: http://dx.doi.org/10.1038/s41586-018-0337-2. Relevance: 37. Git Repo. Refs: 99.
- 40. Matsubara, Yaguchi. 2023. *Number Theoretic Accelerated Learning of Physics-Informed Neural Networks*. cs> arXiv:2307.13869. 14 pages. DOI: https://arxiv.org/abs/2307.13869v2. Relevance: 36.86. Refs: 55.

- Waheed, Haghighat, Alkhalifah, Song, Hao. 2021. PINNeik: Eikonal solution using physics-informed neural networks. Computers & Geosciences. Volume 155, October. 14 pages.
   DOI: https://doi.org/10.1016/j.cageo.2021.104833. Relevance: 36.86. Git Repo. Refs: 64.
- 42. Wang, Teng, Perdikaris. 2020. *Understanding and mitigating gradient pathologies in physics-informed neural networks.* NA. 28 pages. DOI: https://arxiv.org/abs/2001.04536v1. Relevance: 36.75. Git Repo. Refs: 54.
- 43. N, KT, FX, S, O, A, A. 2021. Best practices in machine learning for chemistry. (2021) .Nat Chem 13:505–508. 4 pages. DOI: https://doi.org/10.1038/s41557-021-00716-z. Relevance: 36.5. Refs: 34.
- 44. Li, Zheng, Kovachki, Jin, Chen, Liu, Azizzadenesheli, Anandkumar. 2021. *Physics-Informed Neural Operator for Learning Partial Differential Equations*. 27 pages. DOI: https://doi.org/10.48550/arXiv.2111.03794. Relevance: 36.26. Refs: 58.
- 45. Ren, Rao, Liu, Wang, Sun. 2020. *PhyCRNet: Physics-informed Convolutional-Recurrent Network for Solving Spatio-temporal PDEs.* Computer Methods in Applied Mechanics and Engineering. Volume. 21 pages. DOI: https://doi.org/10.1016/j.cma.2021.114399. Relevance: 36.19. Git Repo. Refs: 86.
- Lu, Jin, Pang, Zhang, Karniadakis. 2021. Learning nonlinear operators via DeepONet based on the universal approximation theorem of operators. 15 pages. DOI: https://doi.org/10.1038/s42256-021-00302-5. Relevance: 36. Git Repo. Refs: 55.
- 47. Moseley, Markham, Nissen-Meyer. 2023. Finite basis physics-informed neural networks (FBPINNs): a scalable domain decomposition approach for solving differential equations.

  Adv Comput Math. 39 pages. DOI: https://doi.org/10.1007/s10444-023-10065-9. Relevance: 35.87. Refs: 64.
- 48. Penwarden, Zhe, Narayan, Kirby. 2021. *Multifidelity Modeling for Physics-Informed Neural Networks (PINNs)*. physics> arXiv:2106.13361. 17 pages. DOI: https://arxiv.org/abs/2106.13361v2. Relevance: 35.35. Refs: 44.

- 49. Wang. 2024. *Scientific Machine Learning for Computational Physics*. SHTC Short Course, Anaheim, CA, July. 103 pages. DOI: NA. Relevance: 35.02. Refs: 40.
- 50. Zhu, Liu, Yan. 2021. *Machine learning for metal additive manufacturing: predicting temperature and melt pool fluid dynamics using physics-informed neural networks*. Computational Mechanics. Volume 67. Issue number 2. State Published Feb 2021. 17 pages. DOI: <a href="https://doi.org/10.1007/s00466-020-01952-9">https://doi.org/10.1007/s00466-020-01952-9</a>. Relevance: 34.94. Refs: 119.
- 51. Chang, Meng, Haber, Ruthotto, Begert, Holtham. 2017. *Reversible Architectures for Arbitrarily Deep Residual Neural Networks*. The Thirty-Second AAAI Conference on Artificial Intelligence (AAAI-18). 8 pages. DOI: http://10.1609/aaai.v32i1.11668. Relevance: 34.88. Refs: 49.
- Kochkov, Smith, Alieva, Wang, Brenner, Hoyer. 2021. Machine learning accelerated computational fluid dynamics. Proceedings of the National Academy of Sciences 118 (21) (2021).. 8 pages. DOI: https://doi.org/10.1073/pnas.2101784118. Relevance: 34.88. Git Repo. Refs: 56.
- 53. Shukla, Jagtap, Karniadakis. 2021. *Parallel Physics-Informed Neural Networks via Domain Decomposition*. arXiv [Submitted on 20 Apr 2021 (v1), last revised 8 Sep 2021 (this version, v3)]. 23 pages. DOI: https://arxiv.org/abs/2104.10013v3. Relevance: 34.83. Refs: 40.
- 54. Fan, Xu, Darve. 2020. Solving Inverse Problems in Steady State Navier-Stokes Equations using Deep Neural Networks. 7 pages. DOI: https://doi.org/10.48550/arXiv.2008.13074. Relevance: 34.43. Git Repo. Refs: 22.
- 55. Zhang, Dao, Karniadakis, Suresh. 2022. *Analyses of internal structures and defects in materials using physics-informed neural networks*. Science Advances. 2022 Feb 18;8(7):eabk0644.doi: 10.1126/sciadv.abk0644. Epub 2022 Feb 16.. 13 pages. DOI: https://doi.org/10.1126/sciadv.abk0644. Relevance: 34.38. Refs: 64.
- Han, Jentzen, E. 2018. Solving high-dimensional partial differential equations using deep learning. Han J, Jentzen A, Weinan E. . Proc Natl Acad Sci 2018;115:8505–10.. 6 pages.
   DOI: https://doi.org/10.1073/pnas.1718942115. Relevance: 33.5. Refs: 32.

- 57. Jia, Benson. 2019. *Neural Jump Stochastic Differential Equations*. Advances in Neural Information Processing Systems 32 (NeurIPS 2019). 12 pages. DOI: NA. Relevance: 33.5. Git Repo. Refs: 45.
- 58. Yıldız, Heinonen, Lähdesmäki. 2019. *ODE2VAE: Deep generative second order ODEs with Bayesian neural networks.* 14 pages. DOI: https://doi.org/10.48550/arXiv.1905.10994. Relevance: 33.5. Git Repo. Refs: 33.
- 59. Rasht-Behesht, Huber, Shukla, Karniadakis. 2021. *Physics-Informed Neural Networks* (*PINNs*) for Wave Propagation and Full Waveform Inversions. Journal of Geophysical Research: Solid Earth, 127. 21 pages. DOI: https://doi.org/10.1029/2021JB023120. Relevance: 33.48. Refs: 54.
- 60. Mkadem, Boumaiza. 2011. *Physically Inspired Neural Network Model for RF Power Amplifier Behavioral Modeling and Digital Predistortion*. IEEE Transactions on Microwave Theory and Techniques, vol. 59, no. 4, pp. 913-923, April 2011. 13 pages. DOI: https://doi.org/10.1109/TMTT.2010.2098041. Relevance: 32.73. Refs: 38.
- 61. Trask, G.Patel, Gross, Atzberger. 2020. *GMLS-Nets: A machine learning framework for unstructured data*. AAAI-MLPS Proceedings, (2020). 9 pages. DOI: https://doi.org/10.485 50/arXiv.1909.05371. Relevance: 31.56. Git Repo. Refs: 30.
- 62. Lusch, Kutz, Brunton. 2018. *Deep learning for universal linear embeddings of nonlinear dynamics*. Nature Communications volume 9, Article number: 4950 (2018). 10 pages. DOI: https://doi.org/10.1038/s41467-018-07210-0. Relevance: 31.5. Git Repo. Refs: 56.
- 63. Sun, Wang. 2020. *Physics-constrained bayesian neural network for fluid flow reconstruction with sparse and noisy data.* 9 pages. DOI: https://doi.org/10.1016/j.taml.2020.01.031. Relevance: 31.44. Git Repo. Refs: 41.
- 64. Cuomo, Cola, Giampaolo, Rozza, Raissi, Piccialli. 2022. *Scientific Machine Learning Through Physics-Informed Neural Networks: Where we are and What's Next.* 85 pages. DOI: https://doi.org/10.1007/s10915-022-01939-z. Relevance: 31.36. Git Repo. Refs: 196.
- 65. Wong, Ooi, Gupta, Chiu, Low, Dao, Ong. 2023. Generalizable Neural Physics Solvers by

- *Baldwinian Evolution*. Neural and Evolutionary Computing. 26 pages. DOI: https://doi.org/10.48550/arXiv.2312.03243. Relevance: 31.31. Git Repo. Refs: 50.
- 66. Kashinath, Mustafa, Albert, Wu, Jiang, Esmaeilzadeh, Azizzadenesheli, Wang, Chattopadhyay, Singh, Manepalli, Chirila, Yu, Walters, White, Xiao, Tchelepi, Marcus, Anandkumar, Hassanzadeh. 2021. *Physics-informed machine learning: case studies for weather and climate modelling*. Royal Society Volume 379 Issue 2194. 36 pages. DOI: https://doi.org/10.1098/rsta.2020.0093. Relevance: 31.28. Git Repo. Refs: 130.
- 67. Detorakis. 2024. *Practical Aspects on Solving Differential Equations Using Deep Learning: A Primer.* 32 pages. DOI: https://arxiv.org/abs/2408.11266v2. Relevance: 31.19. Git Repo. Refs: 67.
- 68. Jeong, Batuwatta-Gamage, Bai, Xie, Rathnayaka, Zhou, Gu. 2023. *A complete Physics-Informed Neural Network-based framework for structural topology optimization*. Computer Methods in Applied Mechanics and Engineering. Volume 417, Part A, 1 December. 22 pages. DOI: https://doi.org/10.1016/j.cma.2023.116401. Relevance: 31.14. Refs: 81.
- 69. Ruthotto, Haber. 2018. *Deep Neural Networks Motivated by Partial Differential Equations*.

  Journal of Mathematical Imaging and Vision. 8 pages. DOI: https://doi.org/10.1007/s108

  51-019-00903-1. Relevance: 30.86. Git Repo. Refs: 40.
- Reyes, Howard, Perdikaris, Tartakovsky. 2020. Learning unknown physics of non-Newtonian fluids. Phys. Rev. Fluids. 6 pages. DOI: https://doi.org/10.1103/PhysRevFluids. 6.073301. Relevance: 30.67. Refs: 23.
- 71. Kanaa, Voleti, Kahou, Pal. 2019. *Simple Video Generation using Neural ODEs.* NeurIPS 2019 Workshop. 10 pages. DOI: https://doi.org/10.48550/arXiv.2109.03292. Relevance: 30.2. Git Repo. Refs: 25.
- 72. Brunton, Hemati, Tair. 2020. *Special issue on machine learning and data-driven methods in fluid dynamics*. Theoretical and Computational Fluid Dynamics.. 5 pages. DOI: https://doi.org/10.1007/s00162-020-00542-y. Relevance: 29.6. Refs: 28.
- 73. Jagtap, Kharazmi, Karniadaki. 2020. Conservative physics-informed neural networks on

- discrete domains for conservation laws: Applications to forward and inverse problems. Computer Methods in Applied Mechanics and Engineering. Volume. 27 pages. DOI: https://doi.org/10.1016/j.cma.2020.113028. Relevance: 29.15. Refs: 30.
- 74. Brunton, Proctor, Kutz. 2016. *Sparse Identification of Nonlinear Dynamics with Control* (*SINDYc*). Accepted for NOLCOS conference. 6 pages. DOI: https://doi.org/10.48550/arXiv.1605.06682. Relevance: 28.83. Refs: 41.
- 75. Li, Kovachki, Azizzadenesheli, Liu, Bhattacharya, Stuart, Anandkumar. 2021. Fourier Neural Operator for Parametric Partial Differential Equations. Published as a conference paper at ICLR 2021. 16 pages. DOI: https://doi.org/10.48550/arXiv.2010.08895. Relevance: 28.69. Refs: 34.
- 76. Jagtap, Kawaguchi, Karniadakis. 2019. Locally adaptive activation functions with slope recovery term for deep and physics-informed neural networks. Proc Math Phys Eng Sci. 2020 Jul 15; 476(2239):20200334.. 20 pages. DOI: https://doi.org/10.1098/rspa.2020.0334. Relevance: 28.6. Git Repo. Refs: 27.
- 77. LeCun, Bengio, Hinton. 2015. *Deep Learning*. Nature 521 (2015)436–444.. 10 pages. DOI: http://dx.doi.org/10.1038/nature14539. Relevance: 28.5. Git Repo. Refs: 103.
- 78. L, B, A, J, A, R, JE, B. 2019. *Models and machines: how deep learning will take clinical pharmacology to the next level.* (2019) . CPTPharmacometrics Syst Pharmacol. https://doi.org/10.1002/psp4.12377. 4 pages. DOI: https://doi.org/10.1002/psp4.12377. Relevance: 28.25. Refs: 10.
- 79. McClenny, Haile, Braga-Neto. 2021. *TensorDiffEq: Scalable Multi-GPU Forward and Inverse Solvers for Physics Informed Neural Networks*. arxiv [Submitted on 30 Mar 2021]. 8 pages. DOI: https://arxiv.org/abs/2103.16034v1. Relevance: 28.25. Refs: 24.
- 80. Darbon, Meng. 2020. On some neural network architectures that can represent viscosity solutions of certain high dimensional Hamilton–Jacobi partial differential equations. Journal of Computational Physics. Volume. 18 pages. DOI: https://doi.org/10.1016/j.jcp.2020.109 907. Relevance: 28.11. Git Repo. Refs: 118.

- 81. Dupont, Doucet, Teh. 2019. Augmented Neural ODEs. 20 pages. DOI: https://doi.org/10.4 8550/arXiv.1904.01681. Relevance: 28.1. Git Repo. Refs: 22.
- 82. Um, Brand, Fei, Holl, Thuerey. 2020. Solver-in-the-loop: Learning from differentiable physics to interact with iterative PDE-solvers. Advances in Neural Information Processing Systems 33 (2020) 6111–6122.. 12 pages. DOI: https://doi.org/10.48550/arXiv.2007.00016. Relevance: 27.67. Git Repo. Refs: 67.
- 83. Cheng, Fu, Wang, Dong, Jin, Jiang, Maa, Qin, Liu. 2022. *Data-driven, multi-moment fluid modeling of Landau damping*. 10 pages. DOI: https://doi.org/10.48550/arXiv.2209.04726. Relevance: 27.5. Refs: 35.
- 84. Bram, Nahum, Schropp, Pfister, Koch. 2023. *Low-dimensional neural ODEs and their application in pharmacokinetics*. Journal of Pharmacokinetics and Pharmacodynamics. 18 pages. DOI: https://doi.org/10.1007/s10928-023-09886-4. Relevance: 27.39. Refs: 41.
- 85. Chen, Shi, He, Fang. 2024. *Data-driven solutions and parameter estimations of a family of higher-order KdV equations based on physics informed neural networks.* Scientific Reports. 27 pages. DOI: https://doi.org/10.1038/s41598-024-74600-4. Relevance: 27.22. Refs: 64.
- 86. Wang, Sankaran, Wang, Perdikaris. 2023. *An Expert's Guide to Training Physics-informed Neural Networks*. cs>arXiv:2308.08468. 36 pages. DOI: https://arxiv.org/abs/2308.08468v1. Relevance: 27.17. Refs: 78.
- 87. Rackauckas, Nie. 2017. DifferentialEquations.jl A Performant and Feature-Rich Ecosystem for Solving Differential Equations in Julia. Journal of Open Research Software 5(1). 10 pages. DOI: https://doi.org/10.5334/jors.151. Relevance: 27.1. Refs: 30.
- 88. Kissas, Yang, Hwuang, Witschey, Detre, Perdikaris. 2020. *Machine learning in cardiovas-cular flows modeling: Predicting arterial blood pressure from non-invasive 4D flow MRI data using physics-informed neural networks*. Computer Methods in Applied Mechanics and Engineering. Volume. 30 pages. DOI: https://doi.org/10.1016/j.cma.2019.112623. Relevance: 27.07. Refs: 69.
- 89. Yu, Lu, Meng, Karniadakis. 2021. Gradient-enhanced physics-informed neural networks for

- forward and inverse PDE problems. Computer Methods in Applied Mechanics and Engineering. Volume. 22 pages. DOI: https://doi.org/10.1016/j.cma.2022.114823. Relevance: 27.05. Refs: 34.
- 90. Hodas, Stinis. 2018. *Doing the Impossible: Why Neural Networks Can Be Trained at All.*Front. Psychol., 11 July 2018 Sec. Cognitive Science. Volume 9 2018. 7 pages. DOI: https://doi.org/10.3389/fpsyg.2018.01185. Relevance: 27. Git Repo. Refs: 23.
- 91. Lu, Zhong, Li, Dong. 2018. Beyond Finite Layer Neural Networks: Bridging Deep Architectures and Numerical Differential Equations. Proceedings of the 35th International Conference on Machine Learning, PMLR 80:3276-3285, 2018.. 15 pages. DOI: https://doi.org/10.48550/arXiv.1710.10121. Relevance: 26.87. Git Repo. Refs: 52.
- 92. Blechschmidt, Ernst. 2021. *Three ways to solve partial differential equations with neural networks A review.* Volume 44, Issue 2 Special Issue:Scientific Machine Learning Part II June 2021 e202100006. 29 pages. DOI: https://doi.org/10.1002/gamm.202100006. Relevance: 26.83. Git Repo. Refs: 183.
- 93. Kosma, Nikolentzos, Panagopoulos, Steyaert, Vazirgiannis. 2023. *Neural Ordinary Differential Equations for Modeling Epidemic Spreading*. Published in Trans. Mach. Learn. Res. 2023. 18 pages. DOI: NA. Relevance: 26.78. Git Repo. Refs: 31.
- 94. Akbarian, Raissi. 2023. *PINNs-TF2: Fast and User-Friendly Physics-Informed Neural Networks in TensorFlow V2*. Machine Learning and the Physical Sciences Workshop, NeurIPS 2023. 13 pages. DOI: https://arxiv.org/abs/2311.03626v1. Relevance: 26.62. Git Repo. Refs: 24.
- 95. Akbarian, Raissi. 2023. PINNs-Torch: Enhancing Speed and Usability of Physics-Informed Neural Networks with PyTorch. NeurIPS 2023 Workshop. 14 pages. DOI: https://openreview.net/forum?id=nl1ZzdHpab. Relevance: 26.57. Git Repo. Refs: 28.
- 96. Pascanu, Gulcehre, Cho, Bengio. 2014. *How to Construct Deep Recurrent Neural Networks*. Accepted at ICLR 2014 (Conference Track).. 13 pages. DOI: https://doi.org/10.48550/arXiv.1312.6026. Relevance: 26.54. Refs: 48.

- 97. Qin, Wu, Xiu. 2019. *Data Driven Governing Equations Approximation Using Deep Neural Networks*. Journal of Computational Physics. Volume. 19 pages. DOI: https://doi.org/10.1016/j.jcp.2019.06.042. Relevance: 26. Refs: 54.
- 98. Stiller, Bethke, Böhme, Pausch, Torge, Debus, Vorberger, Bussmann, Hoffmann. 2020. Large-Scale Neural Solvers for Partial Differential Equations. Driving Scientific and Engineering Discoveries Through the Convergence of HPC, Big Data and AI. SMC 2020. Communications in Computer and Information Science, vol 1315. Springer,. 15 pages. DOI: https://doi.org/10.1007/978-3-030-63393-6\_2. Relevance: 26. Git Repo. Refs: 13.
- 99. Wang, Yu, Perdikaris. 2020. When and why PINNs fail to train: A neural tangent kernel perspective. Journal of Computational Physic. 29 pages. DOI: https://doi.org/10.1016/j.jcp. 2021.110768. Relevance: 26. Git Repo. Refs: 47.
- 100. Koryagin, Khudorozkov, Tsimfer. 2019. *PyDEns: a Python Framework for Solving Differential Equations with Neural Networks.* 8 pages. DOI: https://arxiv.org/abs/1909.11544. Relevance: 25.88. Git Repo. Refs: 9.
- 101. Wang, Wang, Perdikaris. 2021. On the eigenvector bias of Fourier feature networks: From regression to solving multi-scale PDEs with physics-informed neural networks. Computer Methods in Applied Mechanics and Engineering. Volume. 27 pages. DOI: https://doi.org/10.1016/j.cma.2021.113938. Relevance: 25.85. Git Repo. Refs: 49.
- 102. Gal, Ghahramani. 2016. *Dropout as a Bayesian Approximation: Representing Model Uncertainty in Deep Learning*. Proceedings of The 33rd International Conference on Machine Learning, PMLR 48:1050-1059, 2016.. 10 pages. DOI: NA. Relevance: 25.8. Refs: 42.
- 103. Zhang, Gao, Unterman, Arodz. 2020. Approximation Capabilities of Neural ODEs and Invertible Residual Networks. Proceedings of the 37th International Conference on Machine Learning, PMLR 119:11086-11095. 14 pages. DOI: https://doi.org/10.48550/arXiv.1907.12 998. Relevance: 25.57. Refs: 24.
- 104. Liu, Sun, Wang. 2022. Predicting parametric spatio-temporal dynamics by multi-resolution PDE structure-preserved deep learning. Commun Phys. 41 pages. DOI: http://dx.doi.org/10.48550/arXiv.2205.03990. Relevance: 25.54. Refs: 72.

- 105. Alkin, Fürst, Schmid, Gruber, Holzleitner, Brandstetter. 2024. *Universal Physics Transformers: A Framework For Efficiently Scaling Neural Operators*. NeurIPS 2024. 37 pages. DOI: https://doi.org/10.48550/arXiv.2402.12365. Relevance: 25.38. Git Repo. Refs: 119.
- 106. Raissi, Perdikaris, Karniadakis. 2017. *Physics Informed Deep Learning (Part I): Data-driven Solutions of Nonlinear Partial Differential Equations*. 22 pages. DOI: https://doi.org/10.48550/arXiv.1711.10561. Relevance: 25.32. Git Repo. Refs: 24.
- 107. Chen, Lu, Karniadakis, Negro. 2020. Physics-informed neural networks for inverse problems in nano-optics and metamaterials. April 2020 Optics Express 28(8). 16 pages. DOI: https://doi.org/10.48550/arXiv.1912.01085. Relevance: 24.69. Refs: 40.
- 108. Huang, Wang, Lan. 2011. *Extreme learning machines: a survey*. International Journal of Machine Learning and Cybernetics 2(2):107–122. 16 pages. DOI: https://doi.org/10.1007/s13042-011-0019-y. Relevance: 24.56. Refs: 119.
- 109. Pearlmutter. 1995. *Gradient calculations for dynamic recurrent neural networks: a survey.*IEEE Transactions on Neural Networks, vol. 6, no. 5, pp. 1212-1228, Sept. 1995. 21 pages.

  DOI: https://doi.org/10.1109/72.410363. Relevance: 24.5. Refs: 164.
- 110. Long, Lu, Ma, Dong. 2017. *PDE-Net: Learning PDEs from Data*. 17 pages. DOI: https://doi.org/10.48550/arXiv.1710.09668. Relevance: 24.47. Refs: 22.
- 111. Erichson, Muehlebach, Mahoney. 2019. Physics-informed Autoencoders for Lyapunov-stable Fluid Flow Prediction. 14 pages. DOI: https://doi.org/10.48550/arXiv.1905.10866.
  Relevance: 24.36. Refs: 41.
- 112. Chen, Rubanova, Bettencourt, Duvenaud. 2018. Neural Ordinary Differential Equations.
  32nd Conference on Neural Information Processing Systems (NeurIPS 2018), Montréal,
  Canada.. 18 pages. DOI: https://doi.org/10.48550/arXiv.1806.07366. Relevance: 24.33. Git
  Repo. Refs: 60.
- 113. Wang, Zeng, Wang, Shang, Zhang, Luo, Dowling. 2022. When physics-informed data analytics outperforms black-box machine learning: A case study in thickness control for additive manufacturing. Digital Chemical Engineering. 17 pages. DOI: https://doi.org/10.1016/j.dc

- he.2022.100076. Relevance: 24.06. Refs: 60.
- 114. Rao, Sun, Liu. 2021. *Physics informed deep learning for computational elastodynamics without labeled data.* Journal of Engineering Mechanics 147 (8) (2021) 04021043.. 26 pages. DOI: https://arxiv.org/abs/2006.08472v1. Relevance: 24. Git Repo. Refs: 65.
- 115. Ren, Rao, Chen, Wang, Sun, Liu. 2022. SeismicNet: Physics-informed neural networks for seismic wave modeling in semi-infinite domain. 22 pages. DOI: https://doi.org/10.48550/arXiv.2210.14044. Relevance: 24. Git Repo. Refs: 68.
- 116. Raissi, Perdikaris, Karniadakis. 2019. *Physics-informed neural networks: A deep learning framework for solving forward and inverse problems involving nonlinear partial differential equations*. Journal of Computational Physics, vol. 378, pp. 686–707, 2019.. 45 pages. DOI: https://doi.org/10.1016/j.jcp.2018.10.045. Relevance: 23.91. Git Repo. Refs: 50.
- 117. Haghighat, Raissi, Moure, Gomez, Juanes. 2021. *A physics-informed deep learning framework for inversion and surrogate modeling in solid mechanics*. Computer Methods in Applied Mechanics and Engineering. Volume. 22 pages. DOI: https://doi.org/10.1016/j.cma. 2021.113741. Relevance: 23.82. Git Repo. Refs: 51.
- 118. Ruthotto, Osher, Li, Nurbekyan, Fung. 2019. *A Machine Learning Framework for Solving High-Dimensional Mean Field Game and Mean Field Control Problems*. Proc. Natl. Acad. Sci. U.S.A.117 (17) 9183-9193,. 11 pages. DOI: https://doi.org/10.1073/pnas.1922204117. Relevance: 23.82. Git Repo. Refs: 81.
- 119. Mishra, Molinaro. 2021. Estimates on the generalization error of physics-informed neural networks for approximating a class of inverse problems for PDEs Get access Arrow. IMA Journal of Numerical Analysis, Volume 42, Issue 2, April 2022, Pages 981–1022. 35 pages. DOI: https://doi.org/10.1093/imanum/drab032. Relevance: 23.8. Git Repo. Refs: 63.
- 120. McClenny, Braga-Neto. 2020. *Self-Adaptive Physics-Informed Neural Networks using a Soft Attention Mechanism*. cs> arXiv:2009.04544. 24 pages. DOI: https://arxiv.org/abs/2009.04544v5. Relevance: 23.75. Git Repo. Refs: 36.
- 121. Michoski, Milosavljevic, Oliver, Hatch. 2019. Solving Irregular and Data-enriched Differen-

- *tial Equations using Deep Neural Networks.* 22 pages. DOI: https://doi.org/10.48550/arXiv .1905.04351. Relevance: 23.73. Refs: 61.
- 122. Perkins, Jaeger, Reinitz, Glass. 2006. Reverse Engineering the Gap Gene Network of Drosophila melanogaster. PLoS Comput Biol 2(5): e51.. 12 pages. DOI: https://doi.org/10.1371/journal.pcbi.0020051. Relevance: 23.42. Refs: 54.
- 123. Cranmer, Greydanus, Hoyer, Battaglia, Spergel, Ho. 2020. *Lagrangian Neural Networks*.

  Published in ICLR 2020 Deep Differential Equations Workshop.. 9 pages. DOI: https://doi.org/10.48550/arXiv.2003.04630. Relevance: 23.33. Git Repo. Refs: 21.
- 124. Chung, Mai. 2020. Neural Ordinary Differential Equations Network and its Extensions. Hoa Lac campus FPT University. 40 pages. DOI: NA. Relevance: 23.32. Refs: 33.
- 125. Shi, Chen, Wang, Yeung, Woo, 2015. *Convolutional LSTM Network: A Machine Learning Approach for Precipitation Nowcasting*. 9 pages. DOI: https://doi.org/10.48550/arXiv.1506.04214. Relevance: 23.22. Git Repo. Refs: 26.
- 126. Ryck, Jagtap, Mishra. 2022. Error estimates for physics informed neural networks approximating the Navier-Stokes equations. NA. 34 pages. DOI: https://doi.org/10.48550/arXiv.220 3.09346. Relevance: 23.18. Refs: 48.
- 127. Innes, Edelman, Fischer, Rackauckas, Saba, Shah, Tebbutt. 2019. *A Differentiable Programming System to Bridge Machine Learning and Scientific Computing*. Submitted to NeurIPS 2019. 14 pages. DOI: https://arxiv.org/abs/1907.07587v2. Relevance: 23.07. Git Repo. Refs: 49.
- 128. Berman, Buczak, Chavis, Corbett. 2019. *A Survey of Deep Learning Methods for Cyber Security*. Machine Learning for Cyber-Security. 35 pages. DOI: https://doi.org/10.3390/info 10040122. Relevance: 23.06. Refs: 174.
- 129. Han, Gao, Pfaff, Wang, Liu. 2022. *Predicting Physics in Mesh-reduced Space with Tempo-ral Attention*. ICLR 2022. 22 pages. DOI: https://doi.org/10.48550/arXiv.2201.09113. Relevance: 22.95. Refs: 54.
- 130. Cheng, Zhang. 2021. Deep Learning Method Based on Physics Informed Neural Network

- with Resnet Block for Solving Fluid Flow Problems. Water 13, no. 4: 423. 17 pages. DOI: https://doi.org/10.3390/w13040423. Relevance: 22.88. Refs: 30.
- 131. Paszke, Gross, Massa, Lerer, Bradbury, Chanan, Killeen, Lin, Gimelshein, Antiga, Desmaison, Kopf, Yang, DeVito, Raison, Tejani, Chilamkurthy, Steiner, Fang, Bai, Chintala. 2019. *PyTorch: An Imperative Style, High-Performance Deep Learning Library*. Advances in Neural Information Processing Systems 32 (NeurIPS 2019). 12 pages. DOI: https://arxiv.org/abs/1912.01703v1. Relevance: 22.83. Refs: 44.
- 132. Hao, Wang, Su, Ying, Dong, Liu, Cheng, Song, Zhu. 2023. *GNOT: A general neural operator transformer for operator learning*. Proceedings of the 40th International Conference on Machine Learning, pp.12556–12569. PMLR, 2023.. 14 pages. DOI: https://doi.org/10.48550/arXiv.2302.14376. Relevance: 22.57. Git Repo. Refs: 38.
- 133. Sun, Zhang, Schaeffer. 2020. NeuPDE: Neural network based ordinary and partial differential equations for modeling time-dependent data. Mathematical and ScientificMachine Learning, PMLR, 2020, pp. 352–372.. 21 pages. DOI: https://doi.org/10.48550/arXiv.1908.03190. Relevance: 22.57. Refs: 41.
- 134. Hochlehnert, Terenin, Sæmundsson, Deisenroth. 2021. *Learning contact dynamics using physically structured neural networks*. International Conference on Artificial In-telligence and Statistics, PMLR, 2021, pp. 2152–2160.. 10 pages. DOI: https://doi.org/10.48550/arXiv.2102.11206. Relevance: 22.4. Git Repo. Refs: 27.
- 135. He, Zhao, Chu. 2019. *AutoML: A Survey of the State-of-the-Art.* Elsevier Knowledge-Based Systems. Volume. 37 pages. DOI: https://doi.org/10.1016/j.knosys.2020.106622. Relevance: 22.38. Refs: 312.
- 136. Jia, Willard, Karpatne, Read, Zwart, Steinbach, Kumar. 2020. Physics-Guided Machine Learning for Scientific Discovery: An Application in Simulating Lake Temperature Profiles. ACM/IMS Transactions on Data Science, Volume 2, Issue 3. Article No.: 20, Pages 1 - 26. 26 pages. DOI: https://doi.org/10.1145/3447814. Relevance: 22.31. Refs: 62.
- 137. Pang, Lu, Karniadakis. 2019. *fPINNs: Fractional Physics-Informed Neural Networks*. Methods and Algorithms for Scientific Computing. 29 pages. DOI: https://doi.org/10.1137/18

- M1229845. Relevance: 22.24. Refs: 68.
- 138. Kurth, Treichler, Romero, Mudigonda, Luehr, Phillips. 2018. Exascale Deep Learning for Climate Analytics. International Conference for High Performance Computing, Networking, Storage and Analysis. 12 pages. DOI: https://doi.org/10.1109/SC.2018.00054. Relevance: 22.17. Refs: 35.
- Nwankpa, Ijomah, Gachagan, Marshall. 2018. Activation Functions: Comparison of trends in Practice and Research for Deep Learning. 20 pages. DOI: https://doi.org/10.48550/arXiv.1 811.03378. Relevance: 21.95. Refs: 82.
- 140. Du, Dai, Trivedi, Upadhyay, Gomez-Rodriguez, Song. 2016. *Recurrent marked temporal point processes: Embedding event history to vector.* Association for Computing Machinery. 10 pages. DOI: https://doi.org/10.1145/2939672.2939875. Relevance: 21.9. Refs: 40.
- 141. Rudy, Alla, Brunton, Kutz. 2018. *Data-driven identification of parametric partial differential equations*. arxiv math arXiv:1806.00732. 17 pages. DOI: https://arxiv.org/abs/1806.00732v1. Relevance: 21.88. Refs: 63.
- 142. Jagtap, Kawaguchi, Karniadakis. 2020. *Adaptive activation functions accelerate convergence in deep and physics-informed neural networks*. Journal of Computational Physics. Volume. 28 pages. DOI: https://doi.org/10.1016/j.jcp.2019.109136. Relevance: 21.75. Refs: 42.
- 143. Mathews, Francisquez, Hughes, Hatch, Zhu, Rogers. 2021. *Uncovering turbulent plasma dynamics via deep learning from partial observations*. Phys. Rev. E. 11 pages. DOI: https://doi.org/10.1103/PhysRevE.104.025205?\_gl=11wtofrg\_gcl\_auMTQzNjk1OTA4Ni4xNzI5ODI5ODUy\_{\_{0}} Relevance: 21.73. Git Repo. Refs: 55.
- 144. Rackauckas, Innes, Ma, Bettencourt, White, Dixit. 2019. *DiffEqFlux.jl A Julia Library for Neural Differential Equations*. 17 pages. DOI: https://arxiv.org/abs/1902.02376v1. Relevance: 21.65. Refs: 7.
- 145. Greydanus, Dzamba, Yosinski. 2019. *Hamiltonian Neural Networks*. Conference paper at NeurIPS 2019. 11 pages. DOI: https://doi.org/10.48550/arXiv.1906.01563. Relevance: 21.55.

- Git Repo. Refs: 45.
- 146. Raissi, Perdikaris, Karniadakis. 2017. Physics Informed Deep Learning (Part II): Data-driven Discovery of Nonlinear Partial Differential Equations. 19 pages. DOI: https://doi.org/10.485 50/arXiv.1711.10566. Relevance: 21.53. Git Repo. Refs: 18.
- 147. Sirignano, Spiliopoulos. 2018. *DGM: A deep learning algorithm for solving partial dif- ferential equations.* Journal of Computational Physics. Volume. 31 pages. DOI: https://doi.org/10.1016/j.jcp.2018.08.029. Relevance: 21.52. Refs: 49.
- 148. Brunton, Noack, Koumoutsakos. 2020. *Machine Learning for Fluid Mechanics*. Annual Review of Fluid Mechanics Volume. 32 pages. DOI: https://doi.org/10.1146/annurev-fluid-010719-060214. Relevance: 21.44. Refs: 169.
- 149. Lu, Pestourie, Yao, Wang, Verdugo, Johnson. 2020. *Physics-Informed Neural Networks with Hard Constraints for Inverse Design*. SIAM Journal on Scientific Computing. Volume 43 Issue 6 January 2021. Pages: B1105 B1132. 29 pages. DOI: https://doi.org/10.1137/21M1 397908. Relevance: 21.14. Refs: 62.
- 150. Pfaff, Fortunato, Sanchez-Gonzalez, Battaglia. 2020. *Learning Mesh-Based Simulation with Graph Networks*. International Conference on Learning Representations (ICLR), 2021. 18 pages. DOI: https://arxiv.org/abs/2010.03409v4. Relevance: 21.11. Git Repo. Refs: 49.
- 151. Fan, Wang. 2023. Differentiable hybrid neural modeling for fluid-structure interaction.

  Journal of Computational Physics. 42 pages. DOI: https://doi.org/10.1016/j.jcp.2023.1

  12584. Relevance: 21. Refs: 63.
- 152. Pathak, Wikner, Fussell, Chandra, Hunt, Girvan, Ott. 2018. *Hybrid Forecasting of Chaotic Processes: Using Machine Learning in Conjunction with a Knowledge-Based Model.* Chaos. 10 pages. DOI: https://doi.org/10.1063/1.5028373. Relevance: 20.89. Refs: 21.
- 153. Wiewel, Becher, Thuerey. 2018. *Latent-space Physics: Towards Learning the Temporal Evolution of Fluid Flow.* 16 pages. DOI: https://doi.org/10.48550/arXiv.1802.10123. Relevance: 20.88. Refs: 55.
- 154. Brunton, Kutz, Manohar, Aravkin, Morgansen, Klemisch, Goebel, Buttrick, Poskin, Blom-

- Schieber, Hogan, McDonald. 2020. *Data-driven aerospace engineering: Reframing the industry with machine learning*. American Institute of Aeronautics and Astronautics Journal. 35 pages. DOI: https://doi.org/10.48550/arXiv.2008.10740. Relevance: 20.74. Refs: 169.
- 155. Kharazmi, Zhang, Karniadakis. 2021. *hp-VPINNs: Variational physics-informed neural networks with domain decomposition*. Computer Methods in Applied Mechanics and Engineering. Volume. 21 pages. DOI: https://doi.org/10.1016/j.cma.2020.113547. Relevance: 20.43. Refs: 46.
- 156. Li, Du, Zhou, Jing, Zhou, Zeng, Xiao, Zhu, Liu, Zhang. 2022. *ODE Transformer: An Ordinary Differential Equation-Inspired Model for Sequence Generation*. Annual Meeting of the Association for Computational Linguistics. 17 pages. DOI: https://doi.org/10.18653/v1/20 22.acl-long.571. Relevance: 20.29. Git Repo. Refs: 67.
- 157. Rahim, Al-Ramadhan. 2002. *Dynamic equivalent of external power system and its parameter estimation through artificial neural networks*. International Journal of Electrical Power & Energy Systems. Volume 24, Issue 2, February 2002, Pages 113-120. 7 pages. DOI: https://doi.org/10.1016/S0142-0615(01)00016-3. Relevance: 20.29. Refs: 15.
- 158. Pun, Batra, Ramprasad, Mishin. 2019. Physically informed artificial neural networks for atomistic modeling of materials. Nature Communications volume 10, Article number:
  2339 (2019). 10 pages. DOI: https://doi.org/10.1038/s41467-019-10343-5. Relevance:
  20.1. Refs: 70.
- 159. Florio, Schiassi, Furfaro. 2022. *Physics-Informed Neural Networks and Functional Interpolation for Initial Value Problems with Applications to Integro-Differential and Stiff Differential Equations*. AIP Chaos. 18 pages. DOI: https://doi.org/10.1063/5.0086649. Relevance: 19.94. Git Repo. Refs: 53.
- 160. Shin, Darbon, Karniadakis. 2020. On the convergence of physics informed neural networks for linear second-order elliptic and parabolic type PDEs. Communications in Computational Physics, Vol. 28 (2020), Iss. 5: pp. 2042–2074. 31 pages. DOI: https://doi.org/10.48550/arXiv.2004.01806. Relevance: 19.9. Refs: 39.

- 161. Kharazmi, Zhang, Karniadakis. 2019. Variational Physics-Informed Neural Networks For Solving Partial Differential Equations. arXiv e-prints. 24 pages. DOI: https://doi.org/10.485 50/arXiv.1912.00873. Relevance: 19.79. Refs: 39.
- 162. Grathwohl, Chen, Bettencourt, Sutskever, Duvenaud. 2019. *FFJORD: Free-form Continuous Dynamics for Scalable Reversible Generative Models*. 13 pages. DOI: https://doi.org/10.48550/arXiv.1810.01367. Relevance: 19.77. Refs: 23.
- 163. Shukla, Leoni, Blackshire, Sparkman, Karniadakis. 2020. *Physics-informed neural network* for ultrasound nondestructive quantification of surface breaking cracks. arXiv. [Submitted on 7 May 2020]. 19 pages. DOI: https://arxiv.org/abs/2005.03596v1. Relevance: 19.47. Refs: 24.
- 164. Zhang, Yin, Karniadakis. 2020. *Physics-Informed Neural Networks for Nonhomogeneous Material Identification in Elasticity Imaging*. arXiv. [Submitted on 2 Sep 2020]. 10 pages. DOI: https://arxiv.org/abs/2009.04525v1. Relevance: 19.4. Refs: 19.
- 165. Sompolinsky. 1988. *Statistical Mechanics of Neural Networks*. Physics Today 41 (12), 70–80 (1988). 11 pages. DOI: https://doi.org/10.1063/1.881142. Relevance: 19.27. Refs: 21.
- 166. Raissi, Perdikaris, Karniadakis. 2018. Multistep Neural Networks for Data-driven Discovery of Nonlinear Dynamical Systems. 19 pages. DOI: https://doi.org/10.48550/arXiv.1801.0123
  6. Relevance: 19.26. Git Repo. Refs: 31.
- 167. Akhare, Luo, Wang. 2022. Physics-integrated Neural Differentiable (PiNDiff) Model for Composites Manufacturing. Computer Methods in Applied Mechanics and Engineering.. 44 pages. DOI: https://doi.org/10.1016/j.cma.2023.115902. Relevance: 19. Refs: 63.
- 168. He, Zhang, Ren, Sun. 2015. *Deep Residual Learning for Image Recognition*. Proceedings of the IEEE conference on computer vision and pattern recognition, 2016, pp. 770–778.. 12 pages. DOI: https://doi.org/10.48550/arXiv.1512.03385. Relevance: 18.92. Refs: 50.
- 169. Laubscher. 2021. Simulation of multi-species flow and heat transfer using physics-informed neural networks. Physics of Fluids POF21-AR-02440.. 25 pages. DOI: https://doi.org/10.1063/5.0058529. Relevance: 18.88. Refs: 28.

- 170. Lukosevicius, Jaeger. 2009. *Reservoir computing approaches to recurrent neural network training*. Computer Science Review. Volume 3, Issue 3, August 2009, Pages 127-149. 23 pages. DOI: https://doi.org/10.1016/j.cosrev.2009.03.005. Relevance: 18.61. Refs: 149.
- 171. Milano, Koumoutsakos. 2002. *Neural Network Modeling for Near Wall Turbulent Flow*.

  Journal of Computational Physics. Volume 182, Issue. 26 pages. DOI: https://doi.org/10.1006/jcph.2002.7146. Relevance: 18.58. Refs: 28.
- 172. Ramabathiran, Ramachandran. 2021. SPINN: Sparse, Physics-based, and partially Interpretable Neural Networks for PDEs. Journal of Computational Physics, Volume. 58 pages. DOI: https://doi.org/10.48550/arXiv.2102.13037. Relevance: 18.55. Git Repo. Refs: 45.
- 173. Lai, Mylonas, Nagarajaiah, Chatzi. 2021. *Structural identification with physics-informed neural ordinary differential equations*. Journal of Sound and Vibration. Volume. 36 pages. DOI: https://doi.org/10.1016/j.jsv.2021.116196. Relevance: 18.34. Refs: 58.
- 174. Hackenberg, Grodd, Kreutz, Fischer, Esins, Grabenhenrich, Karagiannidis, Binder. 2021. Using differentiable programming for flexible statistical modeling. The American Statistician (2021) 1–10. 25 pages. DOI: https://doi.org/10.1080/00031305.2021.2002189. Relevance: 18.32. Git Repo. Refs: 37.
- 175. Wight, Zhao. 2020. Solving Allen-Cahn and Cahn-Hilliard Equations using the Adaptive Physics Informed Neural Networks. math> arXiv:2007.04542. 25 pages. DOI: https://arxiv.org/abs/2007.04542v1. Relevance: 18.32. Refs: 31.
- 176. Mattheakis, Protopapas, Sondak, Giovanni, Kaxiras. 2019. *Physical Symmetries Embedded in Neural Networks*. 16 pages. DOI: https://arxiv.org/abs/1904.08991v3. Relevance: 18.31. Refs: 22.
- 177. Gao, Wang. 2021. *A Bi-fidelity ensemble kalman method for PDE-constrained inverse problems in computational mechanics*. Comput Mech. 17 pages. DOI: https://doi.org/10.1007/s00466-021-01979-6. Relevance: 18.29. Refs: 57.
- 178. Jordan, Mitchell. 2015. *Machine learning: Trends, perspectives, and prospects*. Science, 349(6245):255–260, 2015. 7 pages. DOI: https://doi.org/10.1126/science.aaa8415. Rele-

- vance: 18.29. Refs: 31.
- 179. Lagaris, Likas, Fotiadis. 1997. *Artificial Neural Networks for Solving Ordinary and Partial Differential Equations*. IEEE Transactions on Neural Networks (Volume: 9, Issue: 5, September 1998). 14 pages. DOI: https://doi.org/10.48550/arXiv.physics/9705023. Relevance: 18.29. Refs: 13.
- 180. Lew, Shah, Pati, Cattell, Zhang, Sandhupatla, Ng, Goli, Sinclair, Rogers, Aamodt. 2018. Analyzing Machine Learning Workloads Using a Detailed GPU Simulator. 2019 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS). 11 pages. DOI: http://dx.doi.org/10.48550/arXiv.1811.08933. Relevance: 18.27. Git Repo. Refs: 19.
- 181. Wang, Perdikaris. 2021. *Deep learning of free boundary and Stefan problems*. Journal of Computational Physics. Volume. 27 pages. DOI: https://doi.org/10.1016/j.jcp.2020.109914. Relevance: 18.26. Git Repo. Refs: 71.
- 182. Xie, Franz, Chu, Thuerey. 2018. tempoGAN: A Temporally Coherent, Volumetric GAN for Super-resolution Fluid Flow. ACM Transactions on Graphics (SIGGRAPH). 2018; 37(4): 1-15.; arXiv pre-print 1801.09710.. 15 pages. DOI: https://doi.org/10.1145/3072959.3073643. Relevance: 18. Git Repo. Refs: 60.
- 183. Yang, Meng, Karniadakis. 2021. *B-PINNs: Bayesian physics-informed neural networks for forward and inverse PDE problems with noisy data.* Journal of Computational Physics. Volume. 32 pages. DOI: https://doi.org/10.1016/j.jcp.2020.109913. Relevance: 18. Refs: 31.
- 184. He, Barajas-Solano, Tartakovsky, Tartakovsky, al. 2020. *Physics-informed neural networks* for multiphysics data assimilation with application to subsurface transport. Advances in Water Resources. Volume 141, July. 38 pages. DOI: https://doi.org/10.1016/j.advwatres.20 20.103610. Relevance: 17.95. Refs: 39.
- 185. Lee, Bahri, Novak, Schoenholz, Pennington, Sohl-Dickstein. 2017. *Deep Neural Networks as Gaussian Processes*. NA. 17 pages. DOI: https://arxiv.org/abs/1711.00165v3. Relevance: 17.94. Refs: 29.

- 186. Gardner, Pleiss, Weinberger, Bindel, Wilson. 2018. *GPyTorch: Blackbox Matrix-Matrix Gaussian Process Inference with GPU Acceleration*. Advances in Neural Information Processing Systems 31 (NeurIPS 2018). 11 pages. DOI: https://arxiv.org/abs/1809.11165v6. Relevance: 17.91. Refs: 53.
- 187. Yang, Perdikaris. 2019. *Adversarial Uncertainty Quantification in Physics-Informed Neural Networks*. Journal of Computational Physics. 33 pages, 7 figures. 33 pages. DOI: https://doi.org/10.1016/j.jcp.2019.05.027. Relevance: 17.88. Git Repo. Refs: 58.
- 188. Kakka. 2022. Sequence to sequence AE-ConvLSTM network for modelling the dynamics of PDE systems. 27 pages. DOI: https://doi.org/10.48550/arXiv.2208.07315. Relevance: 17.85. Git Repo. Refs: 19.
- 189. Goswami, Yin, Yu, Karniadakis. 2021. *A physics-informed variational DeepONet for predicting the crack path in brittle materials*. Computer Methods in Applied Mechanics and Engineering. Volume. 39 pages. DOI: https://doi.org/10.1016/j.cma.2022.114587. Relevance: 17.74. Refs: 53.
- 190. Sun, Han, Gao, Wang, Liu. 2023. Unifying Predictions of Deterministic and Stochastic Physics in Mesh-reduced Space with Sequential Flow Generative Model. 32nd Conference on Neural Information Processing Systems (NeurIPS 2018), Montréal, Canada.. 25 pages. DOI: NA. Relevance: 17.72. Refs: 54.
- 191. Hennigh, Narasimhan, Nabian, Subramaniam, Tangsali, Fang, Rietmann, Byeon, Choudhry. 2021. NVIDIA SimNet: An AI-Accelerated Multi-Physics Simulation Framework. ICCS 2021. ICCS 2021. Lecture Notes in Computer Science(), vol 12746.. 15 pages. DOI: https://doi.org/10.1007/978-3-030-77977-1\_36. Relevance: 17.71. Refs: 20.
- 192. Zhang, Liu, Sun. 2020. *Physics-informed multi-LSTM networks for metamodeling of non-linear structures*. Computer Methods in Applied Mechanics and Engineering. Volume. 21 pages. DOI: https://doi.org/10.1016/j.cma.2020.113226. Relevance: 17.71. Git Repo. Refs: 63.
- 193. Ramachandran, Zoph, Le. 2017. *Searching for Activation Functions*. 13 pages. DOI: https://doi.org/10.48550/arXiv.1710.05941. Relevance: 17.62. Refs: 53.

- 194. Pakravan, Mistani, Aragon-Calvo, Gibou. 2020. *Solving inverse-PDE problems with physics-aware neural networks*. 39 pages. DOI: https://arxiv.org/abs/2001.03608v3. Relevance: 17.54. Refs: 91.
- 195. Patra, Panda, Parida, Arya, Jacobs, Bondar, Sen. 2024. *Physics Informed Kolmogorov-Arnold Neural Networks for Dynamical Analysis via Efficent-KAN and WAV-KAN.* cs>arXiv:2407.18373. 18 pages. DOI: https://arxiv.org/abs/2407.18373v2. Relevance: 17.5. Refs: 50.
- 196. Kollmannsberger, D'Angella, Jokeit, Herrmann. 2021. *Physics-informed neural networks for high-speed flows*. Computational Mechanics. Studies in Computational Intelligence, Springer International Publishing, Cham, p 55–84. 108 pages. DOI: https://doi.org/10.1007/978-3-030-76587-3\_5. Relevance: 17.44. Git Repo. Refs: 92.
- 197. Belbute-Peres, Economon, Kolter. 2020. *Combining differentiable PDE solvers and graph neural networks for fluid flow prediction.* International Conference on MachineLearning, PMLR, 2020, pp. 2402–2411.. 16 pages. DOI: https://doi.org/10.48550/arXiv.2007.04439. Relevance: 17.38. Git Repo. Refs: 25.
- 198. Subramani, Vadivelu, Kamath. 2020. Enabling Fast Differentially Private SGD via Just-in-Time Compilation and Vectorization. arxiv [Submitted on 18 Oct 2020 (v1), last revised 26 Oct 2021 (this version, v2)]. 30 pages. DOI: https://arxiv.org/abs/2010.09063v2. Relevance: 17.37. Refs: 71.
- 199. Darbon, Langlois, Meng. 2019. Overcoming the curse of dimensionality for some Hamilton-Jacobi partial differential equations via neural network architectures. 44 pages. DOI: https://doi.org/10.48550/arXiv.1910.09045. Relevance: 17.34. Refs: 149.
- 200. Raissi. 2017. *Parametric Gaussian Process Regression for Big Data*. arxiv [Submitted on 11 Apr 2017 (v1), last revised 4 May 2017 (this version, v2)]. 6 pages. DOI: https://arxiv.org/abs/1704.03144v2. Relevance: 17.33. Git Repo. Refs: 30.
- 201. Beidokhti, Malek. 2009. Solving initial-boundary value problems for systems of partial differential equations using neural networks and optimization techniques. Journal of the Franklin Institute. Volume 346, Issue 9, November 2009, Pages 898-913. 16 pages. DOI:

- https://doi.org/10.1016/j.jfranklin.2009.05.003. Relevance: 17.31. Refs: 51.
- 202. Weinan. 2017. *A Proposal on Machine Learning via Dynamical Systems*. Commun. Math. Stat.. 13 pages. DOI: https://doi.org/10.1007/s40304-017-0103-z. Relevance: 17.23. Refs: 16.
- 203. Choi, Bahadori, Schuetz, Stewart, Sun. 2016. Doctor AI: Predicting Clinical Events via Recurrent Neural Networks. Proceedings of the 1st Machine Learning for Healthcare Conference, PMLR 56:301-318, 2016.. 18 pages. DOI: https://doi.org/10.48550/arXiv.1511.05942. Relevance: 17.22. Git Repo. Refs: 51.
- 204. Guo, Agarwal, Cooper, Tian, Gao, Guo, Guo. 2022. *Machine Learning for Metal Additive Manufacturing:Towards a Physics-Informed Data-Driven Paradigm.* Journal of Manufacturing Systems. Volume 62, January 2022, Pages 145-163. 40 pages. DOI: https://doi.org/10.1016/j.jmsy.2021.11.003. Relevance: 17.15. Refs: 193.
- 205. Gomez, Ren, Urtasun, Grosse. 2017. The Reversible Residual Network: Backpropagation Without Storing Activations. Computer Vision and Pattern Recognition. 11 pages. DOI: https://doi.org/10.48550/arXiv.1707.04585. Relevance: 17. Git Repo. Refs: 37.
- 206. Liao, Poggio. 2016. Bridging the Gaps Between Residual Learning, Recurrent Neural Networks and Visual Cortex. 14 pages. DOI: https://doi.org/10.48550/arXiv.1604.03640. Relevance: 17. Refs: 39.
- 207. Loiseau, Brunton. 2018. *Constrained sparse Galerkin regression*. J. Fluid Mech.. 27 pages. DOI: https://doi.org/10.1017/jfm.2017.823. Relevance: 17. Git Repo. Refs: 65.
- 208. Morrill, Salvi, Kidger, Foster, Lyons. 2021. Neural Rough Differential Equations for Long Time Series. Proceedings of the Thirty-Second AAAI Conference on Artificial Intelligence, (AAAI-18), the 30th innovative Applications of Artificial Intelligence (IAAI-18), and the 8th AAAI Symposium on Educational Advances in Artificial Intelligence (EAAI-18), New Orleans, Louisiana, USA, February 2-7, 2018, pages 2811–2818. AAAI Press.. 22 pages. DOI: https://doi.org/10.48550/arXiv.2009.08295. Relevance: 16.95. Git Repo. Refs: 37.
- 209. Pang, D'Elia, Parks, Karniadakis. 2020. nPINNs: nonlocal Physics-Informed Neural Net-

- works for a parametrized nonlocal universal Laplacian operator. Algorithms and Applications. Journal of Computational Physics. 31 pages. DOI: https://doi.org/10.1016/j.jcp.2020.109760. Relevance: 16.84. Refs: 38.
- 210. Berg, Nyström. 2019. *Data-driven discovery of PDEs in complex datasets*. Journal of Computational Physics. Volume. 22 pages. DOI: https://doi.org/10.1016/j.jcp.2019.01.036. Relevance: 16.73. Refs: 38.
- 211. Özbay, Hamzehloo, Laizet, Tzirakis, Rizos, Schuller. 2021. *Poisson CNN: Convolutional neural networks for the solution of the Poisson equation on a Cartesian mesh.* Data-Centric Engineering. 2021;2:e6.. 31 pages. DOI: https://doi.org/10.1017/dce.2021.7. Relevance: 16.65. Git Repo. Refs: 40.
- 212. Raissi, Wang, Triantafyllou, Karniadakis. 2019. *Deep learning of vortex-induced vibrations*. Journal of Fluid Mechanics. 29 pages. DOI: https://doi.org/10.1017/jfm.2018.872. Relevance: 16.5. Git Repo. Refs: 51.
- 213. B, H. 1997. *Basic concepts of pharmacokinetic/pharmacodynamic (PK/PD) modelling*. Int J Clin Pharmacol Ther. 1997 Oct;35(10):401-13.. 13 pages. DOI: NA. Relevance: 16.46. Refs: 41.
- 214. Iten, Metger, Wilming, Rio, Renner. 2020. *Discovering Physical Concepts with Neural Networks*. Phys. Rev. Lett.. 18 pages. DOI: https://doi.org/10.1103/PhysRevLett.124.010508. Relevance: 16.44. Git Repo. Refs: 93.
- 215. Jin, Lu, Tang, Karniadakis. 2019. *Quantifying the generalization error in deep learning in terms of data distribution and neural network smoothness*. Neural Networks. Volume 130, October 2020, Pages 85-99. 17 pages. DOI: https://doi.org/10.1016/j.neunet.2020.06.024. Relevance: 16.41. Refs: 62.
- 216. Sun, Gao, Pan, Wang. 2020. Surrogate modeling for fluid flows based on physics-constrained deep learning without simulation data. Computer Methods in Applied Mechanics and Engineering. Volume. 43 pages. DOI: https://doi.org/10.1016/j.cma.2019.112732.
  Relevance: 16.4. Git Repo. Refs: 77.

- 217. Lake, Salakhutdinov, Tenenbaum. 2015. *Human-level concept learning through probabilistic program induction*. Science 350 (2015)1332–1338.. 8 pages. DOI: https://doi.org/10.112 6/science.aab3050. Relevance: 16.38. Git Repo. Refs: 62.
- 218. Sutskever, Vinyals, Le. 2014. *Sequence to Sequence Learning with Neural Networks*. NIPS'14: Proceedings of the 27th International Conference on Neural Information Processing Systems Volume 2. Pages 3104 3112. 9 pages. DOI: https://doi.org/10.48550/arXiv.1409.3215. Relevance: 16.33. Refs: 31.
- 219. O'Leary, Paulson, Mesbah. 2022. *Stochastic Physics-Informed Neural Ordinary Differential Equations*. Journal of Computational Physics. Vol. 468, No. C. 35 pages. DOI: https://doi.org/10.1016/j.jcp.2022.111466. Relevance: 16.17. Git Repo. Refs: 86.
- 220. Patel, Manickam, Trask, Wood, Lee, Tomas, Cyr. 2020. *Thermodynamically consistent physics-informed neural networks for hyperbolic systems*. eprint arXiv:2012.05343. 36 pages. DOI: https://ui.adsabs.harvard.edu/link\_gateway/2020arXiv201205343P/doi: 10.48550/arXiv.2012.05343. Relevance: 16.06. Refs: 80.
- 221. Schiassi, Furfaro, Leake, Florio, Johnston, Mortari. 2021. Extreme theory of functional connections: A fast physics-informed neural network method for solving ordinary and partial differential equations. Neurocomputing. Volume. 29 pages. DOI: https://doi.org/10.1016/j.neucom.2021.06.015. Relevance: 15.96. Refs: 40.
- 222. Kovachki, Li, Liu, Azizzadenesheli, Bhattacharya, Stuart, Anandkumar. 2021. *Neural Operator: Learning Maps Between Function Spaces*. Kovachki, N., Li, Z., Liu, B., Azizzadenesheli, K., Bhattacharya, K., Stuart, A., and Anandkumar, A.Neural operator: Learning maps between function spaces. arXiv preprint arXiv:2108.08481, 2021.. 97 pages. DOI: https://doi.org/10.48550/arXiv.2108.08481. Relevance: 15.88. Git Repo. Refs: 133.
- 223. Alipanahi, Delong, Weirauch, Frey. 2015. *Predicting the sequence specificities of DNA-and RNA-binding proteins by deep learning*. Nature biotechnology 33 (2015) 831–838.. 10 pages. DOI: https://doi.org/10.1038/nbt.3300. Relevance: 15.78. Git Repo. Refs: 51.
- 224. Yin, Zheng, Humphrey, Karniadakis. 2021. *Non-invasive inference of thrombus material properties with physics-informed neural networks.* Computer Methods in Applied Mechan-

- ics and Engineering. 38 pages. DOI: https://doi.org/10.1016/j.cma.2020.113603. Relevance: 15.63. Refs: 63.
- 225. Lu, Jin, Karniadakis. 2020. *DeepONet: Learning nonlinear operators for identifying differential equations based on the universal approximation theorem of operators*. 22 pages. DOI: https://doi.org/10.48550/arXiv.1910.03193. Relevance: 15.59. Git Repo. Refs: 34.
- 226. Raissi. 2018. Deep Hidden Physics Models: Deep Learning of Nonlinear Partial Differential Equations. 26 pages. DOI: https://doi.org/10.48550/arXiv.1801.06637. Relevance: 15.46. Git Repo. Refs: 47.
- 227. Huang, Xu, Farhat, Darve. 2020. Learning Constitutive Relations from Indirect Observations Using Deep Neural Networks. Journal of Computational Physics. Volume. 40 pages. DOI: https://www.sciencedirect.com/science/article/abs/pii/S0021999120302655?via%3Dihub. Relevance: 15.45. Git Repo. Refs: 66.
- 228. Lu, Dao, Kumar, Ramamurty, Karniadakis, Suresh. 2020. Extraction of mechanical properties of materials through deep learning from instrumented indentation. Proc. Natl. Acad. Sci. U.S.A.. 11 pages. DOI: https://doi.org/10.1073/pnas.1922210117. Relevance: 15.45. Git Repo. Refs: 50.
- 229. Baty. 2024. A hands-on introduction to Physics-Informed Neural Networks for solving partial differential equations with benchmark tests taken from astrophysics and plasma physics.

  38 pages. DOI: https://doi.org/10.48550/arXiv.2403.00599. Relevance: 15.42. Git Repo. Refs: 22.
- 230. Baymani, Kerayechian, Effati. 2010. *Arti*⊠*cial neural networks approach for solving stokes problem.* Applied Mathematics, Vol.1 No.4, 2010. 5 pages. DOI: http://dx.doi.org/10.4236/am.2010.14037. Relevance: 15.4. Refs: 8.
- 231. DS, N, L, B. 2022. Introduction of an artificial neural network-based method for concentration-time predictions. (2022) CPT Pharmacometrics Syst Pharmacol11:745–754. https://doi.org/10.1002/psp4.12786. 10 pages. DOI: https://doi.org/10.1002/psp4.12786. Relevance: 15.4. Refs: 21.

- 232. Hagge, Stinis, Yeung, Tartakovsky. 2017. *Solving differential equations with unknown constitutive relations as recurrent neural networks*. arxiv [Submitted on 6 Oct 2017]. 16 pages. DOI: https://arxiv.org/abs/1710.02242v1. Relevance: 15.38. Refs: 12.
- 233. Errico. 1997. *What Is an Adjoint Model?*. Bulletin of the American Meteorological Society. Volume 78. Issue 11. 15 pages. DOI: https://doi.org/10.1175/1520-0477(1997)078%3C2577: WIAAM%3E2.0.CO;2. Relevance: 15.27. Refs: 55.
- 234. Gopalani, Karmakar, Kumar, Mukherjee. 2024. Towards Size-Independent Generalization Bounds for Deep Operator Nets. Transactions on Machine Learning Research. 33 pages. DOI: NA. Relevance: 15.15. Git Repo. Refs: 58.
- 235. Li, Kovachki, Azizzadenesheli, Liu, Bhattacharya, Stuart, Anandkumar. 2020. *Neural Operator: Graph Kernel Network for Partial Differential Equations*. 21 pages. DOI: https://doi.org/10.48550/arXiv.2003.03485. Relevance: 15.1. Git Repo. Refs: 41.
- 236. Lutter, Ritter, Peters. 2019. Deep Lagrangian Networks: Using Physics as Model Prior for Deep Learning. Published at ICLR 2019. 17 pages. DOI: https://doi.org/10.48550/arXiv.190
   7.04490. Relevance: 15. Git Repo. Refs: 47.
- 237. Lipton, Kale, Elkan, Wetzel. 2017. *Learning to Diagnose with LSTM Recurrent Neural Networks*. International Conference on Learning Representations. 18 pages. DOI: https://doi.org/10.48550/arXiv.1511.03677. Relevance: 14.94. Refs: 54.
- 238. Jin, Zhang, Zhu, Tang, Karniadakis. 2020. *SympNets: Intrinsic structure-preserving symplectic networks for identifying Hamiltonian systems.* cs> arXiv:2001.03750. 18 pages. DOI: https://arxiv.org/abs/2001.03750v3. Relevance: 14.89. Refs: 53.
- 239. Gao, Sun, Wang. 2021. *PhyGeoNet: Physics-informed geometry-adaptive convolutional neu*ral networks for solving parameterized steady-state PDEs on irregular domain. Journal of Computational Physics. Volume. 57 pages. DOI: https://doi.org/10.1016/j.jcp.2020.110079. Relevance: 14.72. Git Repo. Refs: 94.
- 240. Zhang, Lu, Guo, Karniadakis. 2019. *Quantifying total uncertainty in physics-informed neu*ral networks for solving forward and inverse stochastic problems. Journal of Computational

- Physics. Volume. 34 pages. DOI: https://doi.org/10.1016/j.jcp.2019.07.048. Relevance: 14.68. Refs: 51.
- 241. Geneva, Zabaras. 2020. *Transformers for Modeling Physical Systems*. Neural Networks; Volume 146, February 2022, Pages 272-289. 39 pages. DOI: https://ui.adsabs.harvard.edu/link\_gateway/2020arXiv201003957G/doi:10.48550/arXiv.2010.03957. Relevance: 14.49. Refs: 73.
- 242. FALSE, Petra, Zhang, Constantinescu, Anitescu. 2016. *A Bayesian Approach for Parameter Estimation With Uncertainty for Dynamic Power Systems*. IEEE Transactions on Power Systems (Volume: 32, Issue: 4, July 2017). 10 pages. DOI: https://doi.org/10.1109/TPWRS. 2016.2625277. Relevance: 14.4. Git Repo. Refs: 40.
- 243. Schaeffer, Caflisch, Hauck, Osher. 2013. *Sparse dynamics for partial differential equations*. Applied Mathematics 110 (17) 6634-6639. 6 pages. DOI: https://doi.org/10.1073/pnas.130 2752110. Relevance: 14.33. Refs: 18.
- 244. Karalias, Loukas. 2020. Erdos Goes Neural: an Unsupervised Learning Framework for Combinatorial Optimization on Graphs. Advances on Neural Information Processing Systems, pp. 6659–6672. 21 pages. DOI: https://doi.org/10.48550/arXiv.2006.10643. Relevance: 14.14. Git Repo. Refs: 88.
- 245. Klooster. 2021. *Approximating differential equations using neural ODEs.* U of Twenhte. Department of Applied Mathematics. Faculty of Electrical Engineering. 22 pages. DOI: NA. Relevance: 14. Refs: 21.
- 246. Graves. 2011. *Practical Variational Inference for Neural Networks*. Advances in Neural Information Processing Systems 24 (NIPS 2011). 9 pages. DOI: NA. Relevance: 13.89. Refs: 26.
- 247. Shahriari, Swersky, Wang, Adams, Freitas. 2016. *Taking the Human Out of the Loop: A Review of Bayesian Optimization*. 28 pages. DOI: https://doi.org/10.1109/JPROC.2015.249 4218. Relevance: 13.82. Refs: 163.
- 248. Perdikaris, Raissi, Damianou, Lawrence, Karniadakis. 2017. Nonlinear information fu-

- sion algorithms for data-efficient multi-fidelity modelling. Proc. R. Soc. A.47320160751. 16 pages. DOI: https://doi.org/10.1098/rspa.2016.0751. Relevance: 13.81. Refs: 26.
- 249. Gao, Han, Fan, Sun, Liu, Duan, Wang. 2024. *Bayesian conditional diffusion models for versatile spatiotemporal turbulence generation*. Computer Methods in Applied Mechanics and Engineering. 37 pages. DOI: https://doi.org/10.1016/j.cma.2024.117023. Relevance: 13.78. Refs: 59.
- 250. Dai, Khalil, Zhang, Dilkina, Song. 2017. Learning Combinatorial Optimization Algorithms over Graphs. Advances on Neural Information Processing Systems, pp. 6351–6361, 2017.
  24 pages. DOI: https://doi.org/10.48550/arXiv.1704.01665. Relevance: 13.75. Git Repo. Refs: 38.
- 251. Cheridito, Jentzen, Rossmannek. 2019. *Efficient approximation of high-dimensional functions with neural networks*. IEEE Trans. Neural Netw. Learn. Syst. (2021). 15 pages. DOI: https://arxiv.org/abs/1912.04310v3. Relevance: 13.33. Refs: 43.
- 252. Siegelmann, Sontag. 1992. *On the computational power of neural nets*. COLT '92: Proceedings of the fifth annual workshop on Computational learning theory. Pages 440 449. 10 pages. DOI: https://doi.org/10.1145/130385.130432. Relevance: 13.3. Refs: 21.
- 253. Hensman, Lawrence. 2013. *Gaussian Processes for Big Data*. arxiv [Submitted on 26 Sep 2013]. 9 pages. DOI: https://arxiv.org/abs/1309.6835v1. Relevance: 13.22. Refs: 17.
- 254. Cao. 2021. *Choose a Transformer: Fourier or Galerkin*. Part of Advances in Neural Information Processing Systems 34 (NeurIPS 2021). 36 pages. DOI: NA. Relevance: 13.11. Git Repo. Refs: 100.
- 255. Yang, Daskalakis, Karniadakis. 2020. Generative Ensemble Regression: Learning Particle

  Dynamics from Observations of Ensembles with Physics-Informed Deep Generative Models.

  cs> arXiv:2008.01915. 35 pages. DOI: https://arxiv.org/abs/2008.01915v2. Relevance:

  13.03. Refs: 32.
- 256. Hornik, Stinchcombe, White. 1989. *Multilayer feedforward networks are universal approximators*. Neural Networks. Volume 2, Issue. 8 pages. DOI: https://doi.org/10.1016/0893-

- 6080(89)90020-8. Relevance: 13. Refs: 26.
- 257. Baty, Baty. 2023. Solving differential equations using physics informed deep learning: a hand-on tutorial with benchmark tests. 23 pages. DOI: https://doi.org/10.48550/arXiv.2302. 12260. Relevance: 12.96. Git Repo. Refs: 7.
- 258. Samaniego, Anitescu, Goswami, Nguyen-Thanh, Guo, Hamdia, Zhuang, Rabczuk. 2020. *An energy approach to the solution of partial differential equations in computational mechanics via machine learning: Concepts, Implementation and Applications.* Computer Methods in Applied Mechanics and Engineering. Volume. 37 pages. DOI: http://dx.doi.org/10.1016/j.cma.2019.112790. Relevance: 12.81. Git Repo. Refs: 29.
- 259. Schmidt, Lipson. 2009. *Distilling Free-Form Natural Laws from Experimental Data*. Science Vol. 324, No. 5923. 6 pages. DOI: https://doi.org/10.1126/science.1165893. Relevance: 12.8. Refs: 25.
- 260. Babuška, Suri. 1990. *The p- and h-p versions of the finite element method, an overview*. Computer Methods in Applied Mechanics and Engineering. Volume 80, Issues 1–3, June 1990, Pages 5-26. 22 pages. DOI: https://doi.org/10.1016/0045-7825(90)90011-A. Relevance: 12.77. Refs: 83.
- 261. Xu, Darve. 2019. The Neural Network Approach to Inverse Problems in Differential Equations. NA. 32 pages. DOI: https://doi.org/10.48550/arXiv.1901.07758. Relevance: 12.75. Refs: 54.
- 262. Meng, Karniadakis. 2020. A composite neural network that learns from multi-fidelity data: Application to function approximation and inverse PDE problems. Journal of Computational Physics. Volume. 29 pages. DOI: https://doi.org/10.1016/j.jcp.2019.109020. Relevance: 12.72. Refs: 37.
- 263. Haber, Ruthotto. 2017. *Stable Architectures for Deep Neural Networks Inverse Problems*. Volume 34, Number 1 Inverse Problems, Volume 34, Number. 23 pages. DOI: https://doi.org/10.48550/arXiv.1705.03341. Relevance: 12.7. Refs: 48.
- 264. Berg, Hasenclever, Tomczak, Welling. 2018. Sylvester Normalizing Flows for Variational

- *Inference*. arxiv [Submitted on 15 Mar 2018 (v1), last revised 20 Feb 2019 (this version, v2)]. 12 pages. DOI: https://arxiv.org/abs/1803.05649v2. Relevance: 12.67. Refs: 27.
- 265. Graepel. 2003. Solving Noisy Linear Operator Equations by Gaussian Processes: Application to Ordinary and Partial Differential Equations. Proceedings of the Twentieth International Conference on Machine Learning. 8 pages. DOI: NA. Relevance: 12.62. Refs: 16.
- 266. Lagaris, Likas, Papageorgiou. 2000. *Neural-network methods for boundary value problems with irregular boundaries*. IEEE Trans Neural Netw. 2000;11(5):1041-9.. 9 pages. DOI: https://doi.org/10.1109/72.870037. Relevance: 12.44. Refs: 12.
- 267. Rowley, Mezic, Bagheri, Schlatter, Henningson. 2009. *Spectral analysis of nonlinear flows*.

  J. Fluid Mech., 645:115–127, 2009.. 13 pages. DOI: https://doi.org/10.1017/S0022112009992
  059. Relevance: 12.38. Refs: 15.
- 268. Zhou. 2024. *Nonlocal Turbulence Models with neural networks*. Virginia Tech. 47 pages. DOI: NA. Relevance: 12.38. Refs: 4.
- 269. Cai, Kang, Wang. 2017. A stochastic SIRS epidemic model with nonlinear incidence rate.

  Applied Mathematics and Computation. Volume. 20 pages. DOI: https://doi.org/10.1016/j.

  amc.2017.02.003. Relevance: 12.35. Refs: 70.
- 270. Majda, Harlim. 2012. *Physics constrained nonlinear regression models for time series*. Non-linearity 26 201. 21 pages. DOI: http://10.1088/0951-7715/26/1/201. Relevance: 12.33. Refs: 39.
- 271. Qiao, Liang, Koltun, Lin. 2020. Scalable Differentiable Physics for Learning and Control.
  ICML 20 Proceedings of the 37th International Conference on Machine Learning. Article
  No.: 727, Pages 7847 7856. 12 pages. DOI: https://doi.org/10.48550/arXiv.2007.02168.
  Relevance: 12.33. Git Repo. Refs: 30.
- 272. Tartakovsky, Marrero, Perdikaris, Tartakovsky, Barajas-Solano. 2018. *Learning Parameters and Constitutive Relationships with Physics Informed Deep Neural Networks.* math> arXiv:1808.03398. 22 pages. DOI: https://arxiv.org/abs/1808.03398v2. Relevance: 12.32. Refs: 28.

- 273. Rackauckas, Ma, Martensen, Warner, Zubov, Supekar, Skinner, Ramadhan, Edelman. 2021. Universal differential equations for scientific machine learning. (2021) arXiv:200104385v4 [csLG]. https://doi.org/10.48550/arXiv.2001.04385. 55 pages. DOI: https://doi.org/10.48550/arXiv.2001.04385. Relevance: 12.27. Git Repo. Refs: 126.
- 274. Mezic. 2013. *Analysis of fluid flows via spectral properties of the koopman operator*. Annual Review of Fluid Mechanics, 45:357–378, 2013.. 24 pages. DOI: https://doi.org/10.1146/annurev-fluid-011212-140652. Relevance: 12.25. Refs: 49.
- 275. Zobeiry, Humfeld. 2021. *A physics-informed machine learning approach for solving heat transfer equation in advanced manufacturing and engineering applications*. Engineering Applications of Artificial Intelligence. Volume 101, May. 27 pages. DOI: https://doi.org/10.1016/j.engappai.2021.104232. Relevance: 12.22. Refs: 24.
- 276. Hui, Chris, Carlos, Claes, Peter, S.. 2018. Spectral/hp element methods: Recent developments, applications, and perspectives. Volume 30, pages 1–22, (2018). 22 pages. DOI: https://doi.org/10.1007/s42241-018-0001-1. Relevance: 12.18. Refs: 144.
- 277. Brunton, Proctor, Kutz. 2016. Discovering governing equations from data by sparse identification of nonlinear dynamical systems. Proc. Natl. Acad. Sci. U.S.A.113 (15) 3932-3937,. 20 pages. DOI: https://doi.org/10.1073/pnas.1517384113. Relevance: 12.08. Refs: 45.
- 278. Lee, You. 2019. *Data-driven prediction of unsteady flow over a circular cylinder using deep learning*. Journal of Fluid Mechanics , Volume 879 , 25 November 2019 , pp. 217 254. 38 pages. DOI: https://doi.org/10.1017/jfm.2019.700. Relevance: 12.05. Refs: 39.
- 279. Pestourie, Mroueh, Rackauckas, Johnson. 2023. *Physics-enhanced deep surrogates for partial differential equations*. Nature Machine Intelligence volume 5, pages 1458–1465 (2023).
  40 pages. DOI: https://doi.org/10.1038/s42256-023-00761-y. Relevance: 12.05. Git Repo. Refs: 52.
- 280. Perdikaris, Venturi, Karniadakis. 2016. Multifidelity Information Fusion Algorithms for High-Dimensional Systems and Massive Data sets. SIAM Journal on Scientific Computing. Vol. 38, Iss. 4 (2016)10.1137/15M1055164. 19 pages. DOI: https://doi.org/10.1137/15M1055164. Relevance: 12. Refs: 35.

- 281. Raissi, Yazdani, Karniadakis. 2020. *Hidden fluid mechanics: Learning velocity and pressure fields from flow visualizations*. Science 367(6481), 1026–1030 (2020). 9 pages. DOI: https://doi.org/10.1126/science.aaw4741. Relevance: 12. Git Repo. Refs: 19.
- 282. Kidger. 2022. *On Neural Differential Equations*. University of Oxford. Mathematical Institute. 231 pages. DOI: https://doi.org/10.48550/arXiv.2202.02435. Relevance: 11.91. Git Repo. Refs: 291.
- 283. Sun, Tao, Du. 2018. Stochastic Training of Residual Networks: a Differential Equation Viewpoint. 20 pages. DOI: https://arxiv.org/abs/1812.00174v1. Relevance: 11.9. Refs: 36.
- 284. Jin, Cai, Li, Karniadakis. 2021. NSFnets (Navier-Stokes flow nets): Physics-informed neural networks for the incompressible Navier-Stokes equations. Journal of Computational Physics. 26 pages. DOI: https://doi.org/10.1016/j.jcp.2020.109951. Relevance: 11.88. Refs: 38.
- 285. Lawrence. 2004. *Gaussian Process Latent Variable Models for Visualisation of High Dimensional Data*. Advances in Neural Information Processing Systems 16 (NIPS 2003). 8 pages. DOI: NA. Relevance: 11.88. Refs: 11.
- 286. Raissi, Babaee, Givi. 2019. *Deep Learning of Turbulent Scalar Mixing*. Phys. Rev. Fluids. 19 pages. DOI: https://doi.org/10.1103/PhysRevFluids.4.124501. Relevance: 11.84. Refs: 69.
- 287. Saxe, McClelland, Ganguli. 2013. Exact solutions to the nonlinear dynamics of learning in deep linear neural networks. International Conference on Learning Representations 2014. 22 pages. DOI: https://doi.org/10.48550/arXiv.1312.6120. Relevance: 11.59. Refs: 25.
- 288. Zhang, Guo, Karniadakis. 2020. Learning in Modal Space: Solving Time-Dependent Stochastic PDEs Using Physics-Informed Neural Networks. SIAM Journal on Scientific Computing. Vol. 42, Iss. 2 (2020)10.1137/19M1260141. 31 pages. DOI: https://doi.org/10.1137/19M1260141. Relevance: 11.58. Refs: 30.
- 289. Zhu, Zabaras, Koutsourelakis, Perdikaris. 2019. *Physics-Constrained Deep Learning for High-dimensional Surrogate Modeling and Uncertainty Quantification without Labeled Data*. Journal of Computational Physics. Volume. 51 pages. DOI: https://doi.org/10.1016/j.jcp.2019.05.024. Relevance: 11.51. Git Repo. Refs: 92.

- 290. Hethcote. 2000. *The Mathematics of Infectious Diseases*. SIAM Review. Vol. 42, Iss. 4 (2000). 55 pages. DOI: https://doi.org/10.1137/S0036144500371907. Relevance: 11.49. Refs: 202.
- 291. Chang, Zhang, Han, Yu, Guo, Tan, Cui, Witbrock, Hasegawa-Johnson, Huang. 2017. *Dilated Recurrent Neural Networks*. Event 31st Annual Conference on Neural Information Processing Systems, NIPS 2017 Long Beach, United States Duration: Dec 4 2017 → Dec 9 2017. 13 pages. DOI: https://doi.org/10.48550/arXiv.1710.02224. Relevance: 11.46. Git Repo. Refs: 30.
- 292. Patel, Trask, Wood, Cyr. 2020. *A physics-informed operator regression framework for extracting data-driven continuum models*. Computer Methods in Applied Mechanics and Engineering. Volume. 38 pages. DOI: https://doi.org/10.1016/j.cma.2020.113500. Relevance: 11.42. Git Repo. Refs: 60.
- 293. Li, Wong, Chen, Duvenaud. 2020. Scalable Gradients for Stochastic Differential Equations. AISTATS 2020. 25 pages. DOI: https://doi.org/10.48550/arXiv.2001.01328. Relevance: 11.32. Git Repo. Refs: 90.
- 294. Zhang, Sandu. 2014. *FATODE: a library for forward, adjoint, and tangent linear integration of ODEs.* SIAM Journal on Scientific ComputingVol. 36, Iss. 5 (2014). 30 pages. DOI: https://doi.org/10.1137/130912335. Relevance: 11.3. Refs: 28.
- 295. Voleti. 2020. *A brief tutorial on Neural ODEs.* 51 pages. DOI: NA. Relevance: 11.29. Git Repo. Refs: 33.
- 296. Shwartz-Ziv, Tishby. 2017. Opening the Black Box of Deep Neural Networks via Information. 19 pages. DOI: https://doi.org/10.48550/arXiv.1703.00810. Relevance: 11.21. Refs: 22.
- 297. Yang, Zhang, Karniadakis. 2020. *Physics-Informed Generative Adversarial Networks for Stochastic Differential Equations*. 35 pages. DOI: https://doi.org/10.1137/18M1225409. Relevance: 11.03. Refs: 38.
- 298. Luo, Kareem. 2020. Bayesian deep learning with hierarchical prior: Predictions from limited

- and noisy data. Structural Safety. Volume 84, May. 34 pages. DOI: https://doi.org/10.1016/j.strusafe.2019.101918. Relevance: 10.82. Refs: 41.
- 299. Chen, Duan, Karniadakis. 2019. Learning and meta-learning of stochastic advectiondi⊠usion-reaction systems from sparse measurements. European Journal of Applied
  Mathematics. 31 pages. DOI: https://doi.org/10.48550/arXiv.1910.09098. Relevance: 10.81.
  Refs: 24.
- 300. Manohar, Brunton, Kutz, Brunton. 2018. *Data-driven sparse sensor placement for reconstruction: Demonstrating the benefits of exploiting known patterns*. IEEE Control Systems Magazine. Volume 38, Issue 3. 34 pages. DOI: https://doi.org/10.1109/MCS.2018.2810460. Relevance: 10.68. Git Repo. Refs: 149.
- 301. Baldillou. 2024. An introduction to neural ordinary differential equations. U of Barcelona.73 pages. DOI: NA. Relevance: 10.66. Git Repo. Refs: 34.
- 302. Schmid. 2010. *Dynamic mode decomposition of numerical and experimental data*. Journal of Fluid Mechanics, 656:5–28, August 2010.. 25 pages. DOI: https://doi.org/10.1017/S00221 12010001217. Relevance: 10.6. Refs: 30.
- 303. Hopfield. 1982. *Neural Networks and Physical Systems with Emergent Collective Computational Abilities.* Proceedings of the National Academy of Sciences. 5 pages. DOI: https://doi.org/10.1073/pnas.79.8.2554. Relevance: 10.4. Refs: 32.
- 304. Zubov, McCarthy, Ma, Calisto, Pagliarino, Azeglio, Bottero, Luján, Sulzer, Bharambe, Vinchhi, Balakrishnan, Upadhyay, Rackauckas. 2021. NeuralPDE: Automating Physics-Informed Neural Networks (PINNs) with Error Approximations. cs> arXiv:2107.09443. 77 pages. DOI: https://arxiv.org/abs/2107.09443v1. Relevance: 10.31. Git Repo. Refs: 60.
- 305. Jin, McCann, Froustey, Unser. 2017. *Deep Convolutional Neural Network for Inverse Problems in Imaging*. IEEE Transactions on Image Processing, vol. 26, no. 9, pp. 4509-4522, Sept. 2017. 14 pages. DOI: https://doi.org/10.1109/TIP.2017.2713099. Relevance: 10.29. Refs: 65.
- 306. Tang, Liu, Durlofsky. 2020. A deep-learning-based surrogate model for data assimilation in

- dynamic subsurface flow problems. 47 pages. DOI: https://doi.org/10.1016/j.jcp.2020.10945 6. Relevance: 10.23. Refs: 47.
- 307. Raissi, Perdikaris, Karniadakis. 2017. *Inferring solutions of differential equations using noisy multi-fidelity data.* Journal of Computational Physics. Volume. 11 pages. DOI: https://doi.org/10.1016/j.jcp.2017.01.060. Relevance: 10.18. Refs: 135.
- 308. Xu, Li, Darve, Harris. 2019. Learning Hidden Dynamics using Intelligent Automatic Differentiation. 25 pages. DOI: https://doi.org/10.48550/arXiv.1912.07547. Relevance: 10.04. Git Repo. Refs: 34.
- 309. Luo, Yang. 2020. *Two-Layer Neural Networks for Partial Differential Equations: Optimization and Generalization Theory*. math> arXiv:2006.15733. 31 pages. DOI: https://arxiv.org/abs/2006.15733v2. Relevance: 9.74. Refs: 52.
- 310. Rosofsky. 2021. *Physics Informed Deep Learning*. UIUC Department of Physics. NCSA Gravity group. HAL Training Series. 19 pages. DOI: NA. Relevance: 9.74. Git Repo. Refs: 24.
- 311. Tartakovsky, Marrero, Perdikaris, Tartakovsky, Barajas-Solano. 2020. *Physics-Informed Deep Neural Networks for Learning Parameters and Constitutive Relationships in Subsurface Flow Problems*. Water Resources Research. Volume 56. Issue number 5. 47 pages. DOI: https://doi.org/10.1029/2019WR026731. Relevance: 9.6. Refs: 43.
- 312. Raissi. 2018. Forward-Backward Stochastic Neural Networks: Deep Learning of Highdimensional Partial Differential Equations. arxiv [Submitted on 19 Apr 2018]. 17 pages. DOI: https://arxiv.org/abs/1804.07010v1. Relevance: 9.59. Refs: 24.
- 313. Basdevant, Deville, Haldenwang, Lacroix, Ouazzani, Peyret, Orlandi, Patera. 1986. *Spectral and finite difference solutions of the Burgers equation*. Computers & fluids 14 (1986) 23–41.. 19 pages. DOI: https://doi.org/10.1016/0045-7930(86)90036-8. Relevance: 9.58. Refs: 15.
- 314. Gulian, Raissi, Perdikaris, Karniadakis. 2018. *Machine Learning of Space-Fractional Dif*ferential Equations. Computer Science > Machine Learning. arXiv:1808.00931. 26 pages.

- DOI: https://arxiv.org/abs/1808.00931v3. Relevance: 9.54. Refs: 40.
- 315. McFall, Mahan. 2009. Artificial Neural Network Method for Solution of Boundary Value

  Problems With Exact Satisfaction of Arbitrary Boundary Conditions. IEEE Transactions on
  Neural Networks (Volume: 20, Issue: 8, August 2009). 13 pages. DOI: https://doi.org/10.1
  109/TNN.2009.2020735. Relevance: 9.54. Refs: 20.
- 316. Shi, Tsymbalov, Dao, Suresh, Shapeev, Li. 2019. *Deep elastic strain engineering of bandgap through machine learning*. Proc. Natl. Acad. Sci. U.S.A.. 6 pages. DOI: https://doi.org/10.1073/pnas.1818555116. Relevance: 9.5. Refs: 29.
- 317. Raissi, Karniadakis. 2018. *Hidden physics models: Machine learning of nonlinear partial differential equations.* Journal of Computational Physics 357(4). 31 pages. DOI: https://www.sciencedirect.com/science/article/abs/pii/S0021999117309014?via%3Dihub. Relevance: 9.43. Git Repo. Refs: 41.
- 318. Raissi, Yazdani, Karniadakis. 2018. *Hidden Fluid Mechanics: A Navier-Stokes Informed Deep Learning Framework for Assimilating Flow Visualization Data.* arxiv [Submitted on 13 Aug 2018]. 33 pages. DOI: https://arxiv.org/abs/1808.04327v1. Relevance: 9.33. Refs: 44.
- 319. Xu, Darve. 2019. *Adversarial Numerical Analysis for Inverse Problems*. 29 pages. DOI: https://doi.org/10.48550/arXiv.1910.06936. Relevance: 9.28. Git Repo. Refs: 36.
- 320. Mhaskar, Poggio. 2019. *Function approximation by deep networks*. Communications in pure and applied mathematics. 9 pages. DOI: https://arxiv.org/abs/1905.12882v2. Relevance: 9.22. Refs: 22.
- 321. Caterini, Chang. 2018. *Generic Representation of Neural Networks*. n: Deep Neural Networks in a Mathematical Framework. SpringerBriefs in Computer Science. Springer, Cham.. 91 pages. DOI: https://doi.org/10.1007/978-3-319-75304-1\_3. Relevance: 9.03. Refs: 2.
- 322. Bradbury, Frostig, Hawkins, Johnson, Leary, Maclaurin, Necula, Paszke, VanderPlas, Milne, Zhang. 2018. *JAX: composable transformations of Python+NumPy programs.* 1

- pages. URL: https://github.com/jax-ml. Relevance: 9. Refs: 0.
- 323. Raissi, Perdikaris, Karniadakis. 2021. *Physics informed learning machines*. US Patent. 54 pages. DOI: NA. Relevance: 8.96. Refs: 2.
- 324. Wu, Zhang. 2017. *Learning physics by data for the motion of a sphere falling in a non-Newtonian fluid.* Communications in Nonlinear Science and Numerical Simulation. Volume 67, February 2019, Pages 577-593. 27 pages. DOI: https://doi.org/10.1016/j.cnsns.2018 .05.007. Relevance: 8.93. Refs: 55.
- 325. Wang, Wu, Ling, Iaccarino, Xiao. 2017. *A Comprehensive Physics-Informed Machine Learning Framework for Predictive Turbulence Modeling*. Physical Review Fluids.. 34 pages. DOI: https://arxiv.org/abs/1701.07102v2. Relevance: 8.88. Refs: 35.
- 326. Dissanayake, Phan-Thien. 1994. *Neural-network-based approximations for solving partial differential equations.* Commun. Numer. Meth. Engng., 10: 195-201. 7 pages. DOI: https://doi.org/10.1002/cnm.1640100303. Relevance: 8.86. Refs: 5.
- 327. Mao, Jagtap, Karniadakis. 2020. *Physics-informed neural networks for high-speed flows*.

  Computer Methods in AppliedMechanics and Engineering. 38 pages. DOI: https://doi.org/10.1016/j.cma.2019.112789. Relevance: 8.74. Refs: 50.
- 328. Brunton, Kutz. 2019. *Data-Driven Science and Engineering: Machine Learning, Dynamical Systems, and Control.* Cambridge University Press. 495 pages. DOI: https://doi.org/10.1017/9781108380690. Relevance: 8.72. Git Repo. Refs: 573.
- 329. Thuerey, Holl, Mueller, Schnell, Trost, Um. 2021. *Physics-based deep learning*. arXiv preprint arXiv:2109.05237, 2021. 287 pages. DOI: https://doi.org/10.48550/arXiv.2109.05237. Relevance: 8.72. Git Repo. Refs: 31.
- 330. Ruder. 2017. *An overview of gradient descent optimization algorithms*. 14 pages. DOI: https://doi.org/10.48550/arXiv.1609.04747. Relevance: 8.5. Git Repo. Refs: 23.
- 331. Wang, Wu, Xiao. 2017. *Physics-informed machine learning approach for reconstructing Reynolds stress modeling discrepancies based on DNS data.* Phys. Rev. Fluids. 36 pages. DOI: https://doi.org/10.1103/PhysRevFluids.2.034603. Relevance: 8.31. Refs: 58.

- 332. Jasak1, Jemcov, Tukovi. 2007. *OpenFOAM: A C++ library for complex physics simula-tions*. In: International Workshop on Coupled Methods in Numerical Dynamics, vol. 1000, pp. 1–20. IUC Dubrovnik Croatia (2007). 20 pages. DOI: NA. Relevance: 8.3. Refs: 24.
- 333. Kutz, Brunton, Brunton, Proctor. 2016. *Dynamic Mode Decomposition: Data-Driven Modeling of Complex Systems*. 241 pages. DOI: NA. Relevance: 8.25. Git Repo. Refs: 313.
- 334. Yin, Ban, Rego, Zhang, Cavinato, Humphrey, Karniadakis. 2021. Simulating progressive intramural damage leading to aortic dissection using an operator-regression neural network. arXiv:2108.11985 [cs.CE] (25 August 2021).. 47 pages. DOI: https://doi.org/10.48550/arXiv.2108.11985. Relevance: 8.11. Refs: 58.
- 335. Bec, Khanin. 2007. *Burgers Turbulence*. Physics Reports. Volume 447, Issues 1–2, August 2007, Pages 1-66. 49 pages. DOI: https://doi.org/10.1016/j.physrep.2007.04.002. Relevance: 7.9. Refs: 112.
- 336. Raissi, Perdikaris, Karniadakis. 2017. *Machine learning of linear differential equations using Gaussian processes*. Journal ofComputational Physics. 18 pages. DOI: https://doi.org/10.1016/j.jcp.2017.07.050. Relevance: 7.83. Refs: 42.
- 337. Schober, Duvenaud, Hennig. 2014. *Probabilistic ODE Solvers with Runge-Kutta Means.* 18 pages. DOI: https://doi.org/10.48550/arXiv.1406.2582. Relevance: 7.72. Refs: 21.
- 338. Rasmussen, Williams. 2006. *Gaussian Processes for Machine Learning*. The MIT Press. ISBN electronic:9780262256834. 266 pages. DOI: https://doi.org/10.7551/mitpress/320 6.001.0001. Relevance: 7.65. Refs: 0.
- 339. Li, Wang, Lee, Luo. 2022. *Physics-informed neural networks for solving multiscale mode-resolved phonon Boltzmann transport equation.* Materials Today Physics. 31 pages. DOI: https://doi.org/10.1016/j.mtphys.2021.100429. Relevance: 7.58. Git Repo. Refs: 63.
- 340. Raissi, Karniadakis. 2016. *Deep Multi-fidelity Gaussian Processes*. Computer Science > Machine Learning arXiv:1604.07484. 14 pages. DOI: https://arxiv.org/abs/1604.07484v1. Relevance: 7.57. Refs: 5.
- 341. Shen, Yang, Zhang. 2019. Nonlinear Approximation via Compositions. Neural Networks,

- Volume 119, November 2019, Pages 74-84. 19 pages. DOI: https://doi.org/10.1016/j.neunet .2019.07.011. Relevance: 7.47. Refs: 52.
- 342. Kirchdoerfer, Ortiz. 2016. *Data-driven computational mechanics*. Computer Methods in Applied Mechanics and Engineering. Volume. 32 pages. DOI: https://doi.org/10.1016/j.cm a.2016.02.001. Relevance: 7.19. Refs: 11.
- 343. Ha, Dai, Le. 2017. *Hypernetworks*. arxiv [Submitted on 27 Sep 2016 (v1), last revised 1 Dec 2016 (this version, v4)]. 29 pages. DOI: https://arxiv.org/abs/1609.09106v4. Relevance: 7.17. Refs: 52.
- 344. Martin, Joachim, Lieven. 2013. *CVXOPT: Convex Optimization*. Astrophysics Source Code Library, record ascl:2008.017. 1 pages. URL: https://github.com/cvxopt/cvxopt. Relevance: 7. Refs: 1.
- 345. Pang, Yang, Karniadakis. 2018. *Neural-net-induced Gaussian process regression for function approximation and PDE solution*. Journal of Computational Physics. Volume. 24 pages. DOI: https://doi.org/10.1016/j.jcp.2019.01.045. Relevance: 6.92. Git Repo. Refs: 24.
- 346. Chen, Fox, Guestrin. 2014. *Stochastic Gradient Hamiltonian Monte Carlo*. ICML 2014 version. 14 pages. DOI: https://arxiv.org/abs/1402.4102v2. Relevance: 6.64. Refs: 22.
- 347. Hopfield, Tank. 1985. "Neural" computation of decisions in optimization problems. 13 pages. DOI: http://dx.doi.org/10.1007/BF00339943. Relevance: 6.5. Refs: 31.
- 348. Logg, Mardal, Wells. 2012. Automated solution of differential equations by the finite element method: The FEniCS book. 722 pages. DOI: https://doi.org/10.1007/978-3-642-23099-8. Relevance: 6.48. Refs: 468.
- 349. Gardner. 1988. *The space of interactions in neural network models*. Journal of Physics A: Mathematical and General, Volume 21, Number 1. 10 pages. DOI: http://10.1088/0305-4470/21/1/030. Relevance: 6.3. Refs: 19.
- 350. BergKaj, Nyström. 2018. A unified deep artificial neural network approach to partial differential equations in complex geometries. Neurocomputing. Volume. 36 pages. DOI: https://doi.org/10.1016/j.neucom.2018.06.056. Relevance: 6.29. Refs: 36.

- 351. Chiaramonte, Kiener. 2018. *Solving differential equations using neural networks*. Stanford. 5 pages. DOI: NA. Relevance: 6.2. Refs: 0.
- 352. Owhadi. 2015. *Bayesian Numerical Homogenization*. Multiscale Modeling & Simulation. Vol. 13, Iss. 3 (2015)10.1137/140974596. 17 pages. DOI: https://doi.org/10.1137/140974596. Relevance: 5.94. Refs: 72.
- 353. Zhu, Yin. 2009. *On competitive Lotka-Volterra model in random environments*. Journal of Mathematical Analysis and Applications 357 (1)(2009) 154–170.. 17 pages. DOI: https://doi.org/10.1016/j.jmaa.2009.03.066. Relevance: 5.71. Refs: 59.
- 354. E.Weinan, Yu. 2018. The Deep Ritz method: A deep learning-based numerical algorithm for solving variational problems. Springer Nature Volume 6, pages 1–12, (2018). 14 pages. DOI: https://doi.org/10.1007/s40304-018-0127-z. Relevance: 5.5. Refs: 12.
- 355. Protter, Qiu, Martin. 1998. Asymptotic error distribution for the Euler scheme with locally Lipschitz coefficients. Stochastic Processes and their Applications. Volume 130, Issue 4, April 2020, Pages 2296-2311. 16 pages. DOI: https://doi.org/10.1016/j.spa.2019.07.003. Relevance: 5.5. Refs: 28.
- 356. Kirkpatrick, Jr, Vecchi. 1983. *Optimization by simulated annealing*. Science. 13 May 1983. Vol 220, Issue 4598pp. 671-680. 12 pages. DOI: http://dx.doi.org/10.1126/science.220.4598. 671. Relevance: 5.45. Refs: 31.
- 357. Raissi, Perdikaris, Karniadakis. 2017. *Numerical Gaussian Processes for Time-dependent and Non-linear Partial Differential Equations*. Methods and Algorithms for Scientific Computing. 51 pages. DOI: https://doi.org/10.1137/17M1120762. Relevance: 5.3. Refs: 37.
- 358. Raissi, Perdikaris, Karniadakis. 2018. Numerical Gaussian processes for time-dependent and nonlinear partial differential equations. SIAM Journal on Scientific Computing 40(1), A172–A198 (2018). 51 pages. DOI: https://doi.org/10.1137/17M1120762. Relevance: 5.3. Refs: 37.
- 359. Kevrekidis, Gear, Hyman, Kevrekidis, Runborg, Theodoropoulos. 2003. *Equation-free*, coarse-grained multiscale computation: Enabling microscopic simulators to perform system-

- level analysis.. Communications in Mathematical Science, 1(4):715–762, 2003.. 74 pages. DOI: http://dx.doi.org/10.4310/CMS.2003.v1.n4.a5. Relevance: 5.29. Refs: 132.
- 360. Bettencourt, Johnson, Duvenaud. 2019. *Taylor-Mode Automatic Differentiation for Higher-Order Derivatives in JAX*. Program Transformations @NeurIPS2019 Oral. 14 pages. DOI: NA. Relevance: 5.14. Refs: 7.
- 361. Gabrielsson, Weiner. 2016. *Pharmacokinetic and pharma-codynamic data analysis: concepts and applications.* (2016) .Lakemedelsakademin i Stockholm AB. 1 pages. DOI: NA. Relevance: 5. Refs: 0.
- 362. Graves. 2016. *Adaptive Computation Time for Recurrent Neural Networks*. arxiv [Submitted on 29 Mar 2016 (v1), last revised 21 Feb 2017 (this version, v6)]. 19 pages. DOI: https://arxiv.org/abs/1603.08983v6. Relevance: 4.95. Refs: 36.
- 363. Friedrich, Siegert, Peinke, Lück, Siefert, Lindemann, Raethjen, Deuschl, Pfister. 2000. *Extracting model equations from experimental data*. Physics Letters A. Volume 271, Issue. 6 pages. DOI: https://doi.org/10.1016/S0375-9601(00)00334-0. Relevance: 4.83. Refs: 10.
- 364. Eldan, Shamir. 2016. *The Power of Depth for Feedforward Neural Networks*. 29th Annual Conference on Learning Theory, PMLR 49:907-940, 2016.. 34 pages. DOI: https://arxiv.org/abs/1512.03965. Relevance: 4.79. Refs: 28.
- 365. Stuart. 2010. *Inverse problems: A Bayesian perspective*. Published online by Cambridge University Press: 10 May 2010. 110 pages. DOI: https://doi.org/10.1017/S096249291000006 1. Relevance: 4.79. Refs: 230.
- 366. Daubechies, DeVore, Foucart, Hanin, Petrova. 2019. *Nonlinear Approximation and (Deep) ReLU Networks*. Constructive Approximation, 55(1), 127-172.. 42 pages. DOI: https://doi.org/10.1007/s00365-021-09548-z. Relevance: 4.69. Refs: 33.
- 367. Cha, Choi, Büyüköztürk. 2017. *Deep learning-based crack damage detection using convolutional neural networks*. Comput. Aided Civ. Inf. Eng.. 19 pages. DOI: http://dx.doi.org/10. 1111/mice.12263. Relevance: 4.67. Refs: 52.
- 368. Owhadi, Scovel, Sullivan. 2015. Brittleness of Bayesian inference under finite information

- in a continuous world. Electron. J. Statist. 9 (1) 1 -. 79 pages. DOI: https://doi.org/10.1214/15-EJS989. Relevance: 4.33. Refs: 108.
- 369. Brunton. 2023. Neural ODEs (NODEs) Physics Informed Machine Learning. [[YouTube]].
  23 pages. URL: https://www.youtube.com/watch?v=nJphsM4obOk. Relevance: 4.22. Refs:
  4.
- 370. Maziar, Perdikaris, Karniadakis. 2018. *Physics Informed Neural Networks*. 1 pages. URL: https://maziarraissi.github.io/PINNs/. Relevance: 4. Refs: 3.
- 371. O'Leary. 2022. Stochastic Physics-Informed Neural Ordinary Differential Equations (SPIN-ODE). NA. 1 pages. URL: https://github.com/jtoleary/SPINODE. Relevance: 4. Refs: 1.
- 372. Bottou, Bousquet. 2008. *The Tradeoffs of Large Scale Learning*. Advances in Neural Information Processing Systems} Volume 40. 17 pages. DOI: NA. Relevance: 3.94. Refs: 30.
- 373. Jin. 2021. Big-Data-Driven Multi-Scale Experimental Study of Nanostructured Block Copolymer's Dynamic Toughness. 24 pages. DOI: NA. Relevance: 3.92. Refs: 0.
- 374. Niyogi, Girosi. 1999. *Generalization bounds for function approximation from scattered noisy data.* Advances in Computational Mathematics. 30 pages. DOI: https://doi.org/10.1023/A:1018966213079. Relevance: 3.9. Refs: 46.
- 375. Chartrand. 2011. *Numerical Differentiation of Noisy, Nonsmooth Data.* ISRN Applied Mathematics. 11 pages. DOI: https://doi.org/10.5402/2011/164564. Relevance: 3.64. Refs: 17.
- 376. Franke, Schaback. 1998. *Solving partial differential equations by collocation using radial basis functions.* Applied Mathematics and Computation. Volume 93, Issue. 12 pages. DOI: https://doi.org/10.1016/S0096-3003(97)10104-7. Relevance: 3.5. Refs: 18.
- 377. Siegert, Friedrich, b. 1998. *Analysis of data sets of stochastic systems*. Physics Letters A. Volume 243, Issues 5–6, 6 July 1998, Pages 275-280. 7 pages. DOI: https://doi.org/10.1016/S0375-9601(98)00283-7. Relevance: 3.14. Refs: 12.
- 378. Lu, Mao, Dong. 2017. Comment on "An Efficient and Stable Hydrodynamic Model With

- Novel Source Term Discretization Schemes for Overland Flow and Flood Simulations' by Xilin Xia et al.. Water Resources Research. 7 pages. DOI: https://doi.org/10.1002/2017WR 021563. Relevance: 3. Refs: 7.
- 379. Manohar, Brunton, Kutz, Brunton. 2017. *Code supplement to "Data-driven sparse sensor placement*. K. Manohar, B. W. Brunton, J. N. Kutz, and S. L. Brunton, "Code supplement to"Datadriven sparse sensor placement"." https://github.com/kmanohar/SSPOR\_pub, January 2017.. 1 pages. URL: https://github.com/kmanohar/SSPOR\_pub. Relevance: 3. Refs: 1.
- 380. Duvenaud. 2018. *Neural Ordinary Differential Equations*. [[YouTube]]. 32 pages. URL: https://www.youtube.com/watch?v=V6nGT0Gakyg. Relevance: 2.94. Git Repo. Refs: 7.
- 381. Griffiths, Higham. 2010. Numerical methods for ordinary differential equations: initial value problems. 274 pages. DOI: http://dx.doi.org/10.1007/978-0-85729-148-6. Relevance: 2.8. Refs: 70.
- 382. Karniadakis, Sherwin. 2013. *Spectral/HP Element Methods for Computational Fluid Dynamics*. Oxford University Press, Oxford. 7 pages. DOI: http://dx.doi.org/10.1093/acprof: oso/9780198528692.001.0001. Relevance: 2.57. Refs: 0.
- 383. Neal. 2011. MCMC using Hamiltonian dynamics. NA. 51 pages. DOI: https://doi.org/10.4 8550/arXiv.1206.1901. Relevance: 2.53. Refs: 48.
- 384. Dagan, Daskalakis, Dikkala, Kandiros. 2020. *Learning Ising models from one or multiple samples*. 64 pages. DOI: https://doi.org/10.48550/arXiv.2004.09370. Relevance: 2.48. Refs: 67.
- 385. Koza, III, Stiffelman. 1999. *Genetic Programming as a Darwinian Invention Machine*. Part of the book series: Lecture Notes in Computer Science ((LNCS,volume 1598)). 18 pages. DOI: https://doi.org/10.1007/3-540-48885-5\_8. Relevance: 2.44. Refs: 33.
- 386. Butcher. 1987. The numerical analysis of ordinary differential equations: Runge-Kutta and general linear methods. 484 pages. DOI: ISBN: 978-0-471-91046-6. Relevance: 2.4. Git Repo. Refs: 136.

- 387. Iserles. 2008. *A first course in the numerical analysis of differential equations*. 481 pages. DOI: https://doi.org/10.1017/CBO9780511995569. Relevance: 2.4. Git Repo. Refs: 6.
- 388. E., J.. 1986. *Learning and relearning in Boltzmann machines*. Parallel Distributed Processing: Explorations in the Microstructure of Cognition. Volume 1: Foundations, MIT Press, Cambridge, MA. pp 282-317. 37 pages. DOI: NA. Relevance: 2.35. Refs: 25.
- 389. Grohs, Hornung, Jentzen, Wurstemberger. 2018. *A proof that artificial neural networks overcome the curse of dimensionality in the numerical approximation of Black-Scholes partial differential equations.* Mem. Amer. Math. Soc.284(2023), no.1410, v+93 pp. 126 pages. DOI: https://arxiv.org/abs/1809.02362v3. Relevance: 2.29. Refs: 103.
- 390. McFall, Albert. 2006. *Artificial neural network method for solving boundary value problems with arbitrary irregular boundaries*. Georgia Institute of Technology. 167 pages. DOI: NA. Relevance: 1.96. Refs: 55.
- 391. Mhaskar, Micchelli. 1992. Approximation by superposition of sigmoidal and radial basis functions. Advances in Applied Mathematics. Volume 13, Issue 3, September 1992, Pages 350-373. 24 pages. DOI: https://doi.org/10.1016/0196-8858(92)90016-P. Relevance: 1.96. Refs: 25.
- 392. Carpenter, Hoffman, Brubaker, Lee, Li, Betancourt. 2015. *The Stan Math Library: Reverse-Mode Automatic Differentiation in C++*. arxiv [Submitted on 23 Sep 2015]. 96 pages. DOI: https://arxiv.org/abs/1509.07164v1. Relevance: 1.92. Refs: 33.
- 393. DeVore, Ron. 2010. *Approximation using scattered shifts of a multivariate function*.

  Transactions of the American Mathematical Society. Vol. 362, No. 12 (DECEMBER 2010), pp. 6205-6229 (25 pages). 25 pages. DOI: https://arxiv.org/abs/0802.2517v1. Relevance: 1.68. Refs: 37.
- 394. Betancourt. 2017. *A Conceptual Introduction to Hamiltonian Monte Carlo*. NA. 60 pages. DOI: https://arxiv.org/abs/1701.02434. Relevance: 1.58. Refs: 32.
- 395. Rumelhart, Hinton, Williams. 1986. *Learning internal representations by error propagation.* 45 pages. DOI: https://doi.org/10.1016/B978-1-4832-1446-7.50035-2. Relevance: 1.04. Refs:

0.

- 396. Neal. 2012. *Bayesian Learning for Neural Networks*. Springer New York, NY. 195 pages. DOI: https://doi.org/10.1007/978-1-4612-0745-0. Relevance: 0.99. Refs: 70.
- 397. Chandrasekhar. 1943. *Stochastic problems in Physics and Astronomy*. Reviews of Modern Physics. 89 pages. DOI: https://doi.org/10.1103/REVMODPHYS.15.1. Relevance: 0.79. Refs: 73.
- 398. NPTEL, Srinivasan. 2019. *Application 4 Solution of PDE/ODE using Neural Networks*. [[YouTube]]. 30 pages. URL: https://www.youtube.com/watch?v=LQ33-GeD-4Y. Relevance: 0.7. Refs: 3.
- 399. Pontryagin. 1962. *Mathematical Theory of Optimal Processes*. Routledge. 385 pages. DOI: https://doi.org/10.1201/9780203749319. Relevance: 0.43. Refs: 40.
- 400. Mao, Lu, Marxen, Zaki, Karniadakis. 2020. *DeepM&Mnet for hypersonics: Predicting the coupled flow and finite-rate chemistry behind a normal shock using neural-network approximation of operators*. Journal of Computational Physics. Volume. 37 pages. DOI: https://doi.org/10.1016/j.jcp.2021.110698. Relevance: 0.19. Refs: 55.
- 401. Goswami, Anitescu, Chakraborty, Rabczuk. 2020. *Transfer learning enhanced physics in- formed neural network for phase-field modeling of fracture.* Theoretical and Applied Fracture Mechanics. Volume 106, April. 21 pages. DOI: https://doi.org/10.1016/j.tafmec.2019. 102447. Relevance: 0.1. Refs: 28.
- 402. Lanthaler, Mishra, Karniadakis. 2021. Error estimates for DeepOnets: A deep learning framework in infinite dimensions. math> arXiv:2102.09618. 123 pages. DOI: https://arxiv.org/abs/2102.09618v3. Relevance: 0.02. Refs: 67.
- 403. PL. 2011. *Pharmacokinetic-pharmacodynamic modeling and simulation*. Bonate PL (2011) . Springer New York, NY. 0 pages. DOI: NA. Relevance: 0. Refs: 0.
- 404. Sabne. 2020. XLA: Compiling Machine Learning for Peak Performance. Google Research. 1 pages. DOI: NA. Relevance: 0. Refs: 0.

## 2. Supporting Papers

- 405. Schmidhuber. 2015. *Deep learning in neural networks: An overview*. Neural Networks. Volume 61, January 2015, Pages 85-117. 33 pages. DOI: https://doi.org/10.1016/j.neunet.2014. 09.003. Relevance: 32.82. Refs: 886.
- 406. Paszke, Gross, Chintala, Chanan, Yang, DeVito, Lin, Desmaison, Antiga, Lerer. 2017.
  Automatic differentiation in PyTorch. NIPS 2017 Workshop Autodiff Decision Program
  Chairs. 4 pages. DOI: NA. Relevance: 19.75. Refs: 6.
- 407. Rasmussen, Ghahramani. 2001. *Occam's Razor*. Part of Advances in Neural Information Processing Systems 13 (NIPS 2000). 7 pages. DOI: NA. Relevance: 18.43. Refs: 5.
- 408. Glorot, Bengio. 2010. *Understanding the difficulty of training deep feedforward neural networks*. International Conference on Artificial Intelligence and Statistics 2010. 8 pages. DOI: NA. Relevance: 16.75. Refs: 20.
- 409. Blundell, Cornebise, Kavukcuoglu, Wierstra. 2015. *Weight Uncertainty in Neural Networks*. In Proceedings of the 32nd International Conference on Machine Learning (ICML 2015). 10 pages. DOI: https://arxiv.org/abs/1505.05424v2. Relevance: 16. Refs: 43.
- 410. Lin, Tegmark, Rolnick. 2017. Why Does Deep and Cheap Learning Work So Well?. J Stat Phys. 16 pages. DOI: https://doi.org/10.1007/s10955-017-1836-5. Relevance: 15.38. Refs: 50.
- 411. Lin, Chen, Yan. 2013. *Network In Network*. 10 pages. DOI: https://doi.org/10.48550/arXiv.1 312.4400. Relevance: 14.1. Refs: 20.
- 412. Tariyal, Majumdar, Singh, Vatsa. 2016. *Greedy Deep Dictionary Learning*. 9 pages. DOI: https://arxiv.org/abs/1602.00203v1. Relevance: 13.44. Refs: 67.
- 413. Krizhevsky, Sutskever, Hinton. 2012. *ImageNet Classification with Deep Convolutional Neural Networks*. Advances in Neural Information Processing Systems. 9 pages. DOI: ht tp://dx.doi.org/10.1145/3065386. Relevance: 10.67. Refs: 26.
- 414. Seefeldt, Sondak, Hensinger, Phipps, Foucar, P., C., N., M., D., Sibusiso, M., M., J., J., G.,

- T., Sean, Paul, M., E., Sidafa. 2017. *Drekar v.2.0.* Sandia National Laboratories (SNL-NM), Albuquerque, NM (United States). 1 pages. DOI: https://doi.org/10.11578/dc.20220414.50. Relevance: 10. Git Repo. Refs: 0.
- 415. Stein. 1987. *Large Sample Properties of Simulations Using Latin Hypercube Sampling*. Technometrics Volume. 10 pages. DOI: https://doi.org/10.2307/1269769. Relevance: 10. Refs: 7.
- 416. Qiao, Özkan, Teich, Hannig. 2020. *The best of both worlds: Combining CUDA graph with an image processing DSL*. 2020 57th ACM/IEEE Design Automation Conference (DAC). 6 pages. DOI: https://doi.org/10.1109/DAC18072.2020.9218531. Relevance: 9.33. Refs: 12.
- 417. Mallat. 2016. *Understanding deep convolutional networks*. Adaptive data analysis: theory and applications' compiled and edited by Norden E. Huang, Ingrid Daubechies and Thomas Y. Hou. 16 pages. DOI: https://doi.org/10.1098/rsta.2015.0203. Relevance: 8.56. Refs: 32.
- 418. LeCun, Touresky, Hinton, Sejnowski. 1988. *A theoretical framework for back-propagation*. In Proceedings of the 1988 connectionist models summer school, volume 1, pages 21–28. CMU,Pittsburgh, Pa: Morgan Kaufmann, 1988.. 9 pages. DOI: NA. Relevance: 7. Refs: 13.
- 419. Sutton, Barto. 2018. Reinforcement Learning: An Introduction, second edition. NA. 548 pages. DOI: ISBN: 9780262039246. Relevance: 6.93. Refs: 782.
- 420. Shi, Dao, Tsymbalov, Shapeev, Li, Suresh. 2020. *Metallization of diamond*. 6 pages. DOI: https://doi.org/10.1073/pnas.2013565117. Relevance: 6.67. Refs: 58.
- 421. Kingma, Ba. 2014. *Adam: A Method for Stochastic Optimization*. NA. 15 pages. DOI: https://doi.org/10.48550/arXiv.1412.6980. Relevance: 6.4. Refs: 23.
- 422. Rajan. 2005. *Materials informatics*. Material Today. Volume 8, Issue 10, October 2005, Pages 38-45. 8 pages. DOI: https://doi.org/10.1016/S1369-7021(05)71123-8. Relevance: 6.12. Refs: 58.
- 423. Haenlein, Kaplan. 2019. A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence. California Management Review 61(4):000812561986492. 11

- pages. DOI: https://doi.org/10.1177/0008125619864925. Relevance: 6.1. Refs: 28.
- 424. Yarotsky. 2017. Error bounds for approximations with deep ReLU networks. Neural Networks. Volume 94, October 2017, Pages 103-114. 31 pages. DOI: https://doi.org/10.1016/j.neunet.2017.07.002. Relevance: 5.84. Refs: 28.
- 425. Mhaskar, Poggio. 2016. *Deep vs. shallow networks: An approximation theory perspective*.

  Analysis and Applications. Vol. 14, No. 06, pp. 829-848 (2016). 16 pages. DOI: https://doi. org/10.1142/S0219530516400042. Relevance: 5.81. Refs: 27.
- 426. Agarwal, Dhar. 2014. *Big Data, Data Science, and Analytics: The Opportunity and Challenge for IS Research.* Information Systems Research 25(3):443-448.. 6 pages. DOI: https://doi.org/10.1287/isre.2014.0546. Relevance: 5.5. Refs: 13.
- 427. Zingg, Chisholm. 1999. *Runge–Kutta methods for linear ordinary differential equations*.

  Applied Numerical Mathematics 31 (1999) 227–238. 12 pages. DOI: https://doi.org/10.101
  6/S0168-9274(98)00129-9. Relevance: 5.42. Refs: 20.
- 428. Draper, Smith. 2014. *Applied regression analysis*. John Wiley & Sons, 2014. 738 pages. DOI: ISBN: 978-0-471-17082-2. Relevance: 5.15. Refs: 342.
- 429. Zhou. 2021. *Machine Learning*. Springer Nature Link. 460 pages. DOI: https://doi.org/10.1 007/978-981-15-1967-3. Relevance: 4.82. Refs: 0.
- 430. Dormand, Prince. 1980. *A family of embedded Runge-Kutta formulae*. Journal of Computational and Applied Mathematics. Volume 6, Issue 1, March 1980, Pages 19-26. 8 pages. DOI: https://doi.org/10.1016/0771-050X(80)90013-3. Relevance: 4.75. Refs: 17.
- 431. Liu, Nocedal. 1989. *On the limited memory BFGS method for large scale optimization*.

  Mathematical Programming. 27 pages. DOI: https://doi.org/10.1007/BF01589116.

  Relevance: 4.67. Refs: 36.
- 432. Griewank. 2012. Who Invented the Reverse Mode of Differentiation?. 12 pages. DOI: https://api.semanticscholar.org/CorpusID:15568746. Relevance: 4.58. Refs: 13.
- 433. Hochreiter, Schmidhuber. 1997. *Long Short-Term Memory*. Neural Computation (1997) 9 (8): 1735–1780.. 32 pages. DOI: https://doi.org/10.1162/neco.1997.9.8.1735. Relevance:

- 4.28. Refs: 41.
- 434. Khoury, Ioannidis. 2014. *Medicine. Big data meets public health.* Science, 346(6213):1054–1055, 2014.. 4 pages. DOI: https://doi.org/10.1126%2Fscience.aaa2709. Relevance: 4. Refs: 15.
- 435. Marx. 2013. *The big challenges of big data.* Nature, 498(7453):255–260, 2013.. 5 pages. DOI: https://doi.org/10.1038/498255a. Relevance: 3.8. Refs: 3.
- 436. Bodaghi, Wang, Xue, Zheng. 2023. Effects of antagonistic muscle actuation on the bilaminar structure of ray-finned fish in propulsion. Journal of Fluid Mechanics. 22 pages. DOI: https://doi.org/10.1017/jfm.2023.839. Relevance: 3.64. Refs: 46.
- 437. Burgers. 1948. *A Mathematical Model Illustrating the Theory of Turbulence*. Advances in Applied Mechanics. Volume. 29 pages. DOI: https://doi.org/10.1016/S0065-2156(08)70100-5. Relevance: 3.55. Refs: 0.
- 438. Falcon. 2019. *PyTorch Lightning*. GitHub. 1 pages. URL: https://github.com/Lightning-AI/pytorch-lightning. Relevance: 3. Refs: 0.
- 439. Archibald, Fraser, Grattan-Guinness. 2005. *The history of differential equations*, 1670–1950. 66 pages. DOI: https://doi.org/10.14760/OWR-2004-51. Relevance: 2.48. Refs: 159.
- 440. Mohri, Rostamizadeh, Talwalkar. 2018. *Foundations of Machine Learning, second edition.*The MIT Press. 496 pages. DOI: ISBN: 9780262039406. Relevance: 2.15. Refs: 0.
- 441. Hall. 2005. *Generalized Method of Moments*. In book A Companion to Theoretical Econometrics. 16 pages. DOI: https://doi.org/10.1002/9780470996249.ch12. Relevance: 2.07. Refs: 15.
- 442. Calvo, Montijano, Randez. 1990. *A fifth-order interpolant for the Dormand and Prince Runge-Kutta method.* Journal of Computational and Applied Mathematics. Volume 29, Issue. 10 pages. DOI: https://doi.org/10.1016/0377-0427(90)90198-9. Relevance: 2. Refs: 11.
- 443. Nguyen, Carilli, Eryilmaz, Singh, Lin, Gimelshein, Desmaison, Yang. 2021. *Accelerating PyTorch with CUDA Graphs*. PyTorch. 1 pages. DOI: NA. Relevance: 2. Refs: 0.

- 444. Golub, Loan. 2012. Matrix Computations. 780 pages. DOI: NA. Relevance: 1.9. Refs: 777.
- 445. Plaut, Nowlan, Hinton. 1986. *Experiments on Learning by Back Propagation*. 45 pages. DOI: NA. Relevance: 1.69. Refs: 11.
- 446. Garey, Johnson. 1979. *Computers and Intractability: A Guide to the Theory of NP-Completeness*. Journal of Symbolic Logic 48 (2):498-500 (1983). 175 pages. DOI: NA. Relevance: 1.52. Refs: 731.
- 447. Pinkus. 1999. *Approximation theory of the MLP model in neural networks*. 30 pages. DOI: https://doi.org/10.1017/S0962492900002919. Relevance: 1.2. Refs: 7.
- 448. Driscoll, Hale, Trefethen. 2014. *Chebfun Guide*. 212 pages. DOI: NA. Relevance: 1.1. Git Repo. Refs: 1.
- 449. Whitham. 2011. *Linear and Nonlinear Waves*. Wiley. Applied Mathematics in Science. 660 pages. DOI: ISBN: 978-0-471-35942-5. Relevance: 1.1. Refs: 0.
- 450. Yadan. 2019. *Hydra a framework for elegantly configuring complex applications*. GitHub. 1 pages. URL: https://github.com/facebookresearch/hydra. Relevance: 1. Refs: 0.
- 451. Harry. 1915. Some Recent Researches on the Motion of Fluids. Monthly Weather Review, vol. 43, issue 4, p. 163. 8 pages. DOI: https://doi.org/10.1175/1520-0493(1915)43%3C163: SRROTM%3E2.0.CO;2. Relevance: 0.5. Refs: 65.
- 452. Hinton, Srivastava, Swersky. 2012. Neural Networks for Machine Learning. Lecture 6a.

  Overview of mini-batch gradient descent. Open Journal of Applied Sciences, Vol.14 No.6,

  June. 31 pages. DOI: NA. Relevance: 0.39. Refs: 0.
- 453. Sakurai. 1995. *Modern quantum mechanics, revised edition*. Sakurai, J. J. and Commins, E. D. Modern quantum mechanics, revised edition. AAPT, 1995.. 635 pages. DOI: https://doi.org/10.1119/1.17781. Relevance: 0.34. Refs: 0.
- 454. Daubechies. 1992. *Ten Lectures on Wavelets*. CBMS-NSF Regional Conference Series in Applied Mathematics. 344 pages. DOI: https://doi.org/10.1137/1.9781611970104. Relevance: 0.27. Refs: 11.

455. Abadi, Agarwal, Barham, Brevdo, Chen, Citro, Corrado, Davis, Dean, Devin, Ghemawat, Goodfellow, Harp, Irving, Isard, Jia, Jozefowicz, Kaiser, Kudlur, Levenberg, Mane, Monga, Moore, Murray, Olah, Schuster, Shlens, Steiner, Sutskever, Talwar, Tucker, Vanhoucke, Vasudevan, Viegas, Vinyals, Warden, Wattenberg, Wicke, Yu, Zheng. 2016. *TensorFlow: Large-Scale Machine Learning on Heterogeneous Distributed Systems*. 19 pages. DOI: https://arxiv.org/abs/1603.04467v2. Relevance: 0.05. Refs: 56.

## **Processing Summary**

## Files generated:

- citations.bib BibTeX bibliography file
- citations\_dataframe.csv Structured dataset for analysis
- piml-citations-455.html HTML web report
- piml-citations-455.pdf PDF report

## Vault citations folder statistics:

• Referenced folder: 404 papers

• Supporting folder: 51 papers

• Unreferenced folder: 0 papers

• Scientific ML core papers: 404 papers

• Supporting papers: 51 papers

• No rated papers: 0 papers