

OPEN-SOURCE SOFTWARE IN MECHANICS

TRACK NUMBER 1800 - SCIENTIFIC COMPUTING

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ABSTRACT

This mini-symposium aims to bring together developers and users of open-source scientific software libraries for solid mechanics, fluid mechanics, and multiphysics applications. It will encompass discussions on software design and performance, which includes topics such as data structures, the implementation of approximation methods, adaptive hp-refinement, and high-performance computing. Additionally, the mini-symposium will delve into linear solvers for large systems of equations, meshing tools, and various pre- and post-processing tools. Intended as a forum for developers, contributors, and users of open software libraries, the mini-symposium will facilitate the sharing of knowledge and experience about modern infrastructures, emerging technologies, and algorithms. It will also cover performance profiling, testing, and development. The symposium will provide insights into the process of building and managing communities of developers and users, drawing from experiences with successful and widely-used open-source codes [1-5]: FEniCS project, deal.II, MFEM, PETSc, MoFEM, and others.

REFERENCES

- [1] Alnæs, M. et al. "The FEniCS project version 1.5.", *Arch. Num. Softw.* 3.100:9-23 (2015).
- [2] Bangerth, W. et al. "Deal.II - a general-purpose object-oriented finite element library." *ACM Transactions on Mathematical Software (TOMS)* 33.4:24 (2007).
- [3] Anderson, R. et al. "MFEM: A modular finite element methods library." *Computers & Mathematics with Applications*, 81 (2021).
- [4] Balay, S. et al. "PETSc users manual revision 3.7. No. ANL--95/11 Rev. 3.7" Argonne National Lab, Argonne, IL (United States) (2016).
- [5] Kaczmarczyk, Ł. et al. "MoFEM: An open source, parallel finite element library". *Journal of Open Source Software*, 5(45):1441 (2020).