

# PMFF-GO: A Parallel Modern Fortran Framework for Global Optimization with Economic Applications\*

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## Abstract

We develop a massively scalable implementation of the global optimization algorithm by harnessing the capabilities of object-oriented programming and co-arrays, both intrinsic to the modern Fortran 2018 standard. We incorporate into our framework several cutting-edge techniques and concepts from numerical methods, machine learning, and language design, such as low-discrepancy sequence draws, density-based spatial clustering, optimized static work distribution, and an efficient queueing mechanism. We demonstrate the scalability and efficiency of the solver on the set of standard test functions for global optimization. Then, we illustrate the software’s capabilities on two economic applications: calibration of the standard incomplete markets model and estimation of the state-of-the-art New Keynesian DSGE with potentially binding zero-lower bound. Our initial tests deliver supreme performance of the solver relative to the existing alternatives.

**Keywords:** Parallel processing, Modern Fortran, Global Optimization

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