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**Parallel
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Performance analysis of MPI-based FEniCS/PETSc models in pyMOR

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Models of complex dynamical systems are usually high dimensional, especially if they are built from finite element discretisations. Model order reduction methods aim to reduce the computational effort required for such simulations by building lower dimension models that approximate the original model's behaviour. pyMOR implements multiple model order reduction algorithms that can be applied to models of various finite element tools. As pyMOR has to deal with the full order models, support for backend parallelisations has been implemented to reduce the computation time. The parallel performance of the balanced truncation model order reduction of FEniCS models with PETSc backend in pyMORs is analysed in this thesis. Nonsymmetric models and symmetric models with the default settings have been found to show poor scaling behaviour. Further implementation effort is required to increase the efficiency of solving nonsymmetric Lyapunov equations. A symmetric benchmark model reached a sufficient speedup with systems of multiple millions of equations if the settings in DOLFIN and MPI are adjusted accordingly. However, the resource utilisation is very low, even considering the limitations of sparse linear algebra.