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Parallelization in time of numerical simulations of drift-wave turbulence using the parareal algorithm[1] RAUL SANCHEZ, Oak Ridge National Laboratory, DEBASMITA SAMADDAR, DAVID NEWMAN, University of Alaska — The simulation of turbulent fusion plasmas is very computationally intensive due to the large disparity of timescales that play a role in the dynamics. It is widely accepted that first principles simulations of ITER-relevant plasmas are currently unfeasible, and will remain so for quite sometime unless some important algorithmic advances are made. Even shorter simulations of a more restricted range of timescales, such as those based on gyrokinetics, are usually limited to tens of thousands of CPUs due to interprocessor communication, not scaling up to the 100,000+ CPUs that current supercomputers offer. In this contribution we test successfully a recently proposed scheme to parallelize in time the integration of systems of PDEs on a drift-wave turbulence code [1]. The lessons learnt from this exercise suggest that an additional parallelization path exists to enable longer simulations, more complete physics models and a better utilization of existing computational resources.

[1] D. Samaddar, D.E. Newman and R. Sanchez, J. Comput. Phys. 229, 6558 (2010)

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