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Linux Parallel Gyrokinetic Solver

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The latest nonlinear results from GYRO, GA's parallel, full-radius, electromagnetic, gyrokinetic solver, are detailed. This poster is intended as a companion to that presented by Waltz *et al.*, and emphasizes the numerical aspects of the GYRO project. In particular, we discuss the (i) computation and resolution of axisymmetric flows and geodesic acoustic modes, (ii) advantages and disadvantages of using a radial (rather than spectral) representation of the fields, (iii) numerical method used to overcome the effective Courant condition on nonlinear terms, (iv) use of scaLAPACK for distributed matrix algebra required for the global field-solve, and (v) use of our own suite of MPI data mapping algorithms for 1D parallelization required for each instance of operator splitting.

The parallel version of the code was developed through interactive use of GA's 18-processor Beowulf-class computer, LUNA (6 GFLOP max., 4.4 Gb RAM). For production-size simulations, we use GA's 46-processor Beowulf computer STELLA (23 GFLOP max, 18Gb RAM) as well as the mcurie T3E at NERSC. Code performance on all these platforms is detailed and compared.

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