Progress on TGYRO: the steady-state gyrokinetic transport code

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Abstract

We report on the status and development of a prototype steady-state gyrokinetic transport code, TGYRO. This prototype is being developed as part of a SciDAC-funded project (partner to the larger FACETS project) to develop software to integrate micro-scale gyrokinetic turbulence simulations into a framework for practical multi-scale simulation of a burning plasma core. It is our intention to aggressively pursue the International Thermonuclear Experimental Reactor (ITER) as an eventual simulation target after a period of code validation.

Currently, the TGYRO code has two operational modes:

1. **global**: a feedback scheme is applied to a single global GYRO simulation for which target fluxes are specified. The temperature and density profiles are then adjusted dynamically until the GYRO fluxes match the target fluxes;

2. **local**: in the spirit of traditional local transport codes, the flux is calculated independently at points along the minor radius, and profiles are adjusted in order to satisfy steady-state power balance. At each radius, one can run call a nonlinear gyrokinetic simulations (GYRO) [1], an advanced gyrofluid model (TGLF) [2] or simple transport model (IFS-PPPL).

There is a unified software interface to control both of these operational modes which resembles closely the more well-known GYRO user interface. The global feedback scheme is currently being beta tested by selected GYRO users, whereas the local scheme is still under development. In this presentation we will focus on details of the local scheme only.

This work is supported by the U.S. Department of Energy under Grant No. DE-FG03-95ER54309.

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