# Trinity Multiscale Transport Code Development for Experimental Comparison

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The Trinity multiscale transport code [1] has been extensively upgraded to further its use in experimental comparison. The upgrades to Trinity have extended its capability to work with experimental data, allowed it to evolve the magnetic equilibrium self-consistently (at fixed current) and significantly enhanced the range and performance of its turbulent transport modeling options.

To enhance its capability to reproduce experiment, Trinity is now able to take output from the CRONOS integrated modelling suite [2], which is able to provide high quality reconstructions of experimental equilibria of, for example, JET. Trinity has also been integrated with the CHEASE Grad-Shafranov code [3]. This allows the magnetic equilibrium to be re-computed self consistently as the pressure gradient evolves.

Trinity has been given new options for modeling turbulent transport. These include the well-known TGLF framework [4], and the newly developed GPU-based nonlinear code GRYFX. These will allow rapid initial scans with Trinity before more detailed gyrokinetic modeling.

An ongoing programme is improving the performance of Trinity by implementing intelligent load balancing for the turbulent transport calculations. Trinity's performance will also benefit from an extensive programme to upgrade one of its primary gyrokinetic turbulence modeling options GS2 [5]. These include improvements to performance and scaling using new MPI techniques, and complete rewrites of old modules to remove bottlenecks and streamline development.

We present a summary of these improvements and preliminary results of a project to use Trinity to analyse hybrid discharges in JET.

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