Dimensionless scaling laws of confinement in fusion plasmas with the 5D non-linear GYrokinetic SEmi-LAgrangian code (GYSELA)

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This work addresses non-linear global gyrokinetic simulations of ITG turbulence in a simple toroidal geometry with the GYSELA code. This code solves the gyrokinetic equation for ions, coupled to a quasi-electroneutrality condition. The electron response is assumed adiabatic. The particularity of GYSELA code is to solve the Vlasov-Poisson like system on a fixed grid with a Semi-Lagrangian (SL) scheme [1] for the entire distribution function. The 4D non-linear drift-kinetic version of the code has already shown the interest of such a SL method [2]. The energy conservation, which is recognized as a key test of validity, was achieved with an accuracy better than 2.5%.

Results with the new 5D version of GYSELA will be presented, in particular a scan of turbulent transport for several values of the normalized gyroradius ρ_*. The aim is to determine the dimensionless scaling law of confinement and to compare it with previous studies in this field [3]-[4].

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