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PhD Thesis Abstract

Turbulent transport in the scrape-off layer in the low collisionality regime

To model and accurately reproduce the plasma properties we see in today's tokamaks and infer the best-case scenarios for future devices (such as ITER or DEMO), our present understanding in plasma turbulence is not enough. This is particularly true in the Scrape-Off Layer (SOL) of these devices, the region that regulates heat load, impurity dynamics and boundary conditions for the core. In order to gain a deeper understanding of SOL turbulence, the objective of my thesis is to derive a hybrid kinetic-fluid model applicable in this particular region. With the use of the Global Braginskii Solver (GBS) code, after this task is done we can actually numerically simulate this novel theory and compare our results with both cases: kinetic and fluid codes. If we finally derive an accurate heat flux in the limiter/divertor of magnetic confinement fusion devices, the success of the fusion program will be one step closer.