

Modern challenges in the gyrokinetic modeling of turbulent transport in tokamak plasmas

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Modeling turbulent transport in tokamaks requires to describe spatial scales from the plasma minor radius (a few meters) to the electron Larmor radius (one tenth of millimeter) and time scales from the energy confinement time (a few seconds) to the turbulence characteristic period (a few nanoseconds). To efficiently solve a problem spanning so many scales and to better apprehend the underlying physics obviously requires simplifying assumptions. In the first part of the talk, the standard assumptions and simplifications used in the gyro-kinetic model will be summarized. With the development of high power computing facilities and the refinement of transport models, many of these simplifications can and need to be relaxed. A few examples related to modern transport issues will then be given for which it is required to go beyond the standard simplifications.