

The validation project on the TORPEX basic plasma physics experiment

Paolo Ricci

CRPP Lausanne

Owing to its detailed diagnostics, feasibility of parameter scans, and relatively simple configuration, the basic plasma physics experiment TORPEX is an ideal testbed in which to perform experiment/simulation comparisons and to contribute to the establishment of the validation methodology. Focusing on observables related to Langmuir probe measurements, we consider a number of physical quantities that can be used as observables for experiment/simulation comparison. We classify the observables according to a hierarchy that sums the number of model assumptions and measurement combinations used to obtain an observable from experimental measurements and simulation results. This methodology has been used to validate two models that have been developed to simulate TORPEX turbulence: a three-dimensional two-fluid model, able to describe the global evolution of TORPEX plasma, and a reduced two-dimensional two-fluid model, able to describe only the evolution of flute modes. We show that the validation metric reveals the unsatisfactory agreement of the two-dimensional model and the experiment when non-flute modes are present in the experiment.