Bringing Anomalous Transport Models to the TRANSP Code as IMAS Components

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The ITER Integrated Modeling and Analysis Suite (IMAS) is utilized in this research to develop a generalized approach to transport model implementation in the TRANSP code [1]. Similar to the efforts in the European Transport Simulator (ETS) [2], the transport models in TRANSP will communicate with all other components through the Interface Data Structures (IDSs) that are defined in the IMAS Data Model. The Multi-Mode Model (MMM) v8.2 [3] for anomalous transport has been selected for testing and initial implementation of the new interface to IDSs. The `core_profiles` and `equilibrium` IDSs are used to initialize the model, and the `core_transport` IDS is used for the model output. Using these three IDSs, the MMM v8.2 model communicates with other relevant modules such as the equilibrium and transport solvers. In this work, we also demonstrate how to utilize the new IMAS interface for the stability analysis of experimental data and for the neural network development for MMM v8.2. For these tasks, the experimental data and kinetic equilibrium reconstructions come from the OMAS interface in OMFIT [4], which is connected to several experimental databases. This capability provides an opportunity to test the IMAS interface for anomalous transport models using the experimental data from several tokamaks until direct IMAS plugins for these tokamaks are developed. The experimental data are being saved in a local IMAS database and retrieved by a standalone MMM v8.2 driver program. The stability analysis of experimental data and neural network model development can be substantially accelerated with this workflow.

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