A Development Path for a Validated Pedestal Model*

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The development of a pedestal model faces three significant challenges when compared to existing core transport models: 1) characterization of the sources and sinks 2) time dependence and 3) a very short gradient scale length. All three of these challenges must be overcome if a validated pedestal model is to be produced which can serve in integrated models of total plasma performance. The most basic tests of a model require determination of fluxes through each transport channel. However, measurement of the particle source, to determine the convective fluxes in the pedestal region, is very difficult. A significant diagnostic effort coupled with interpretive analysis offers potential for progress. Pedestal model sensitivity to neutral density and ionization rates should also be characterized to determine the accuracy that is needed for particle source measurements. The pedestal also has an inherent time dependence as the pedestal structure evolves from the L-H transition to the first edge localized mode (ELM), and then from ELM to ELM. Pedestal profile measurements must take into account this time dependence of all species and parameters, otherwise MHD constraints, i.e. ELMs, will be convoluted into any time-averaged characterization. In turn, pedestal models must develop sufficient time-dependent capability to examine evolution of the pedestal on the ELM-to-ELM time scale. A final challenge involves the short spatial scale of the pedestal. For the model these scale lengths imply the possibility of non-locality of transport and modification of neoclassical transport. Experimental measurements must obtain not only high spatial resolution for the basic profiles, but must also in characterize turbulence and the pedestal bootstrap current. Further opportunities for overcoming these challenges in developing a pedestal model will be discussed.

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