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Advances in optimization and uncertainty quantification of ITER scenarios[1] ALEXEI PANKIN, SCOTT KRUGER, JOHN CARY, Tech-X Corporation, ARNOLD KRITZ, TARIQ RAFIQ, Lehigh University — Determination of plasma conditions that lead to improved confinement is extremely important for efficient ITER operation. Results for optimization of ITER performance is frequently obtained through heuristic predictive modeling using reduced transport models. Limited subsets of input parameters, typically associated with a mixture of heating mechanisms, are generally considered. Prediction uncertainty associated with the extrapolation of reduced models to new parameter space is usually not addressed. Recent improvements in computational capabilities and numerical algorithms as well as the development of new techniques for sensitivity analysis, uncertainty quantification, and optimization can be used to bring the robustness of ITER scenario modeling to a new level. The development of an approach that utilizes these techniques for optimization and uncertainty quantification of ITER performance is considered. In this study the DAKOTA toolkit for uncertainty quantification and optimization is used to optimize the plasma energy confinement time of ITER discharges by controlling the H-mode pedestal parameters. The effect of uncertainty in pedestal width predictions on the fusion power production is quantified and reported.

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