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A framework for control simulations using the TRANSP code[1]
MARK D. BOYER, Princeton Plasma Physics Laboratory, ORISE, ROB ANDRE, DAVID GATES, STEFAN GERHARDT, Princeton Plasma Physics Laboratory, IMENE GOUMIRI, Princeton University, JON MENARD, Princeton Plasma Physics Laboratory — The high-performance operational goals of present-day and future tokamaks will require development of advanced feedback control algorithms. Though reduced models are often used for initial designs, it is important to study the performance of control schemes with integrated models prior to experimental implementation. To this end, a flexible framework for closed loop simulations within the TRANSP code is being developed. The framework exploits many of the predictive capabilities of TRANSP and provides a means for performing control calculations based on user-supplied data (controller matrices, target waveforms, etc.). These calculations, along with the acquisition of "real-time" measurements and manipulation of TRANSP internal variables based on actuator requests, are implemented through a hook that allows custom run-specific code to be inserted into the standard TRANSP source code. As part of the framework, a module has been created to constrain the thermal stored energy in TRANSP using a confinement scaling expression. Progress towards feedback control of the current profile on NSTX-U will be presented to demonstrate the framework.

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