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Feasibility study of ECRH in NSTX-U startup plasma N. A. LOPEZ, Princeton University, F. POLI, G. TAYLOR, Princeton Plasma Physics Laboratory, R. HARVEY, YU. PETROV, CompX — A key mission goal of the National Spherical Torus eXperiment Upgrade (NSTX-U) is the demonstration of fully non-inductive startup and operation. In part to accomplish this, a 1MW, 28 GHz ECRH system is presently being developed for implementation on NSTX-U in 2018. Like most spherical tokamaks, NSTX-U operates in the overdense regime ($f_{pe} > f_{ce}$), which limits traditional ECRH to the early startup phase. An extensive modelling effort of the propagation and absorption of EC waves in the evolving plasma is thus required to define the most effective window of operation, and to optimize the launcher geometry for maximal heating and for current drive during this window. In fact, the ECRH system will play an important role in preparing a target plasma for subsequent injection of IC waves and NBI. Here we assess the feasibility of O1-mode ECRH in NSTX-U startup plasma at full field of 1T through time-dependent simulations performed with the transport solver TRANSP. Linear ray-tracing calculations conducted by GENRAY are coupled into the TRANSP framework, allowing the plasma equilibrium and the temperature profiles to evolve self-consistently in response to the injected microwave power. Furthermore, we investigate additional possibilities of heating and current drive made available through coupling the injected O-mode power to the electrostatic EBW via the slow X-mode as an intermediary.

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