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Seeking Stable Detachment Scenarios of Advanced X-Divertors with SOLPS 5.1[1] BRENT COVELE, PRASHANT VALANJU, MIKE KOTSCHENREUTHER, SWADESH MAHAJAN, UT-Austin Institute for Fusion Studies, JOHN CANIK, Oak Ridge National Laboratory, HUTCH NEILSON, CHARLES KESSEL, Princeton Plasma Physics Laboratory, BRIAN LABOMBARD, STEPHEN WOLFE, MIT Plasma Science & Fusion Center — A broad investigation into new magnetic equilibria for several tokamaks (C-Mod, NSTX-Upgrade, K-DEMO, and a Fusion Nuclear Science Facility) using the CORSICA code has revealed a host of advanced X-Divertors (XDs) feasible on existing and planned PF coil sets. Because of their flaring flux tubes and higher Divertor Index ($\mathrm{DI}_{XD} > 1$), XDs may open regimes of stable divertor detachment without negatively impacting H-Mode confinement, something which has not been experimentally achievable with a standard divertor ($\mathrm{DI}_{SD} \equiv 1$). To investigate stable X-Divertor detachment, 2D transport modeling is performed using the SOLPS 5.1 code suite. Sophisticated neutral physics modeling in the Eirene 2008 code, including neutral-neutral interactions, is required to accurately model the evolution of detachment. Initial results show steep, steady-state parallel electron temperature gradients near the divertor targets, as well as a reduction in the target heat fluxes. This is indicative of an arrestment of the detachment front near the targets, as predicted by the Divertor Index.

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