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Linear Plasma Response Model Based on the Solution to a Perturbed Grad-Shafranov Equation,* A.S. Welander, D.A. Humphreys, M.L. Walker, *General Atomics*; D.A. Gates, E. Kolemen, *PPPL*; B. Xiao, *ASIPP* – Linearized models of the plasma response to variations in conductor currents are important for design of equilibrium shape, position, and stability control. We describe a new plasma response model based on the linearly perturbed Grad-Shafranov equation. Inputs to the model are changes in applied flux from conductor currents, as well as pressure and current profiles. The change of pressure and current profiles can be derived from changes in the total thermal energy content, W_{th} or β_p, total plasma current, I_p and normalized inductance, l_i, together with assumptions about the details of the profiles. Alternatively, some or all of these can be supplied as exogenous variables. The flexibility in constraints that can be applied depending on the relevant plasma operating regime or scenario is a key feature of the new model. The model predicts changes in the plasma boundary, as well as changes in the q-profile and displacement of q-contours. Validation results will be presented based on data from DIII-D, NSTX, and EAST.

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