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Relaxed Perturbed Equilibria in Tokamaks JONG-KYU PARK, Princeotn Plasma Physics Laboratory, ALAN GLASSER, University of Washington, ALLEN BOOZER, Columbia University, JONATHAN MENARD, Princeton Plasma Physics Laboratory — Perturbed equilibria can efficiently model tokamak plasma responses to small 3D magnetic fields. Ideal Perturbed Equilibrium Code (IPEC) and its applications have shown its validness in a wide range of plasma conditions. However, it is also important to understand plasma responses when 3D magnetic fields open magnetic islands in a localized region nearby the rational surfaces, while most of regions remain ideal. In these relaxed perturbed equilibria, the same Euler-Lagrange equations for δW can be used to solve the ideal force balance, but non-ideal part of solutions should be maintained to control shielding currents and thus to allow magnetic islands at the rational surfaces. DCON and IPEC codes have been modified for this purpose. Initial tests have shown that a relaxed perturbed equilibrium can be unstable even when an ideal perturbed equilibrium is highly stable, which implies in this case that an island cannot be stably relaxed nor maintained. Physics in relaxed perturbed equilibria is more complex than in ideal perturbed equilibria, as will be discussed in details. This work was supported by the US DOE Contract #DE-AC02-09CH11466.

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