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**MHD modeling of disruption mitigation by high-pressure gas jet on Alcator C-Mod** V.A. IZZO, R.S. GRANETZ, M.L. REINKE, MIT, D.G. WHYTE, M. BAKHTIARI, Univ. Wisconsin, Madison — MHD plays an important role in a massive-gas-jet-induced thermal quench in the case that only shallow impurity penetration is possible. This is seen in a series of NIMROD simulations with an assumed fixed penetration depth and a simple impurity radiation model. These simulations qualitatively reproduce several characteristics of a real C-Mod thermal quench triggered by gas jet injection. The simulations predict the fastest quench when the impurities penetrate to the q=2 surface, with an increasing delay preceding the quench as the separation between the penetration depth and q=2 increases. This prediction can be tested experimentally by scanning the $q_{95}$ of the target plasma over a wide range of values. By coupling NIMROD with the 0D radiation code KPRAD, simulations with accurate radiation rates, tracking all charge state populations, are possible for several gas species. In addition, models for neutral penetration and subsequent impurity mixing are included in the code with the goal of achieving quantitative predictability for gas jet disruption mitigation. Initial results from the new code are presented. Accuracy of the impurity penetration and mixing is assessed by comparison with experimental bolometry data.

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