# The role of MHD in 3D aspects of massive gas injection

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**Abstract.** Simulations of massive gas injection (MGI) for disruption mitigation in DIII-D are carried out to compare the toroidal peaking of radiated power for the cases of one and two gas jets. The radiation toroidal peaking factor (TPF) results from a combination of the distribution of impurities and the distribution of heat flux associated with the $n = 1$ mode. When ignoring the effects of strong uni-directional neutral beam injection and rotation present in the experiment, the injected impurities are found to spread helically along field lines preferentially toward the high-field-side, which is explained in terms of a nozzle equation. Therefore when considering the plasma rest frame, reversing the current

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direction also reverses the toroidal direction of impurity spreading. During the pre-thermal quench phase of the disruption, the toroidal peaking of radiated power is reduced in the straightforward manner by increasing from one to two gas jets. However, during the thermal quench phase, reduction in the TPF is achieved only for a particular arrangement of the two gas valves with respect to the field line pitch. In particular, the relationship between the two valve locations and the 1/1 mode phase is critical, where gas valve spacing that is coherent with 1/1 symmetry effectively reduces TPF.