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Predicting the necessary impurity quantities for thermal quench mitigation in ITER disruptions RYAN SWEENEY, MICHAEL LEHNEN, DI HU, JOSEPH SNIPES, ITER Organization — During a thermal quench (TQ) in a 15 MA scenario in ITER, heat fluxes can significantly exceed melt limits. It is planned to inject neon (Ne) atoms to radiate $> 90\%$ of the thermal energy in this scenario. However, an upper-limit on the current quench rate prohibits the use of more than 4×10^{22} Ne atoms. Previous simulation work finds the required Ne quantity for ITER TQ mitigation is marginal with respect to this limit, however a cross-machine validation of this simulation is missing, and thus its accuracy is unknown. Scaling laws and 0D and pseudo-1D models of varying complexity are developed to compare estimates of the required Ne quantity for TQ mitigation. The physics considered in these models includes atomic radiation with non-coronal equilibrium effects, the scaling of the TQ duration with the minor radius, dilution cooling, and radial localization of the impurities. These models are compared with published data on the "minimum necessary injected impurity quantity" for TQ mitigation. The published data are converted to quantities assimilated before the TQ, using measured efficiencies and 1D simulations of gas flow in injection pipes. Implications on the required Ne quantity for ITER TQ mitigation will be discussed.

Joseph Snipes
ITER Organization

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