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Disruption study advances in the JET metallic wall

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Disruption remains the major risk for the operation of ITER and fusion reactors. JET is now equipped with three fast disruption mitigation valves (DMVs) located at different poloidal and toroidal locations mimicking the ITER set-up of DMVs. In JET, massive gas injection (MGI) from one DMV is systematically applied with 90% deuterium and 10% Argon when a disruption event is detected for plasma current above 2MA or energy content in excess of 5MJ total energy. Using the JET disruption mitigation system, the vessel forces during vertical displacement of disruptions could be reduced by 40% and the asymmetric forces fully mitigated.

In the past two years JET has developed a comprehensive scientific programme in view of understanding and controlling disruptions in the metallic environment. In particular, using the set of DMVs, important advances have been achieved in understanding the efficiency of massive gas injection, the impact of the electro-magnetic loads and radiation asymmetry. The need to mitigate disruptions up to high plasma current (4.5MA) has prompted pragmatic approaches to disruption prediction. Modelling efforts has also been carried out for a better understanding of the electromagnetic loads (halo currents) and massive gas injection physics.

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