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First experimental result of disruption mitigation by shattered pellet

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The mitigation of disruption damage is essential for the safe operation of a large-scale tokamak. Disruption mitigation by shattered pellet injection (SPI) has been proposed to achieve safe operation of ITER. A dedicated argon SPI system that focuses on disruption mitigation and runaway current dissipation has been designed for the J-TEXT tokamak. The pellet can be injected with speed of 200-300 m/s. The performance of disruption mitigation by Ar SPI has been compared with identical Ar massive gas injection (MGI). The cooling process observed from the ECE indicates that the SPI has deeper deposition. The current quench rate of SPI induced disruption is more than 100 MA/s. The increase of plasma density during fast shutdown is higher than that with identical Ar MGI. The dissipation of runaway current by Ar SPI is about 12 MA/s, which is lower than that with Ar MGI.

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