

Suppressing the appearance of tearing mode during increasing plasma current

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The island caused by tearing modes are one of the major performance limitation for magnetically confined fusion. Large islands even lead to mode locking and the following major disruption [1-3], and tearing mode often occurs when the plasma current is increasing. So it is important to suppress the appearance of tearing mode during plasma current increasing. Previously there had been studies on resistive tearing modes by using resonant magnetic perturbations (RMPs) on J-TEXT tokamak [4-5].

In this paper, the effect of RMPs on the occurrence of tearing mode is studied in J-TEXT tokamak by supplying static RMPs before tearing mode occurred on increasing plasma current discharges. It is found that there is an amplitude interval of applied RMPs can suppress the occurrence of tearing mode and avoid disruption with increasing plasma current. For a too small RMPs amplitude,

however, leads to an earlier disruption, and continue to reduce the amplitude of applied RMPs, the later the tearing mode and disruption occur. For a too large RMPs amplitude, leads to a penetration and disruption, and continue to increase the amplitude of applied RMPs, leads to earlier penetration and disruption. For low-q discharge, the optimal RMPs amplitude can lower the limit of the edge safe factor.

References

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