The rapid response of 2/1 tearing mode to electrode biasing in J-TEXT experiments

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The effects of electrode biasing (EB) on the m/n = 2/1 tearing modes(TM) have been experimentally studied in J-TEXT tokamak, where m and n are the poloidal and toroidal mode numbers. According to the response time, the response of 2/1 tearing mode to EB can be divided into two processes, the rapid response and the slow response. In the rapid response, what needs to be noted is that the variation of EB current is proportional to the variation of tearing mode frequency, regardless of the EB current rise time, position of electrode, and bias voltage. On the base of that EB can supply a torque to change the tearing mode frequency quickly, the EB has been applied to unlock the locked mode. The experimental results show that the mode locking can be avoided by the negative bias voltage. While, it’s unfortunately that the EB can’t unlock the locked mode in recent experiments, which is different from our conjecture. In summary, the experimental results suggest that applied electrode biasing is a possible method for the avoidance of mode locking and disruption.