

Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

The locking and unlocking thresholds for tearing modes in a cylindrical tokamak¹ WEN-LONG HUANG, University of Science and Technology of China, PING ZHU, University of Science and Technology of China, University of Wisconsin-Madison — The locking and unlocking thresholds for tearing modes are in general different. In this work, the physics origin for this difference is illustrated from theory analysis, and a numerical procedure is developed to find both unlocking and locking thresholds. In particular, the unlocking threshold can be determined from the lowest amplitude of the RMP (resonant magnetic perturbation) allowed for the locking mode solution. Above the unlocking threshold, a different threshold exists due to the presence of two different regimes for the locked mode states. In the first regime, the locked mode state may or may not be reachable depending on the initial conditions of the tearing mode. In the second regime, the locked mode state can always be reached regardless of the initial conditions of the tearing mode. The lowest RMP amplitude for the second regime is determined to be the mode locking threshold. Numerical examples will be presented and discussed.

¹Supported by National Magnetic Confinement Fusion Science Program of China Grants 2014GB124002 and 2015GB120005.

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Date submitted: 23 Jul 2015

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