

Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Simulation of the effects of energetic ions on tearing modes¹ HUI-SHAN CAI, University of Science and Technology of China, GUOYONG FU, Princeton University — The physics of energetic ions and tearing modes are two critical problems in ITER. It is important to understand the physics of the influences of energetic ions on tearing modes, and to explore the control method for tearing modes by energetic ions in ITER and future tokamaks. Recently, it was found that tearing instability can be enhanced by counter circulating energetic ions (CEI) and can be reduced by co-CEI [1]. In this work, the simulation of the effects of energetic ions on linear tearing modes by the M3D code is performed. We focus on the kinetic effects of energetic ions on tearing modes in the low beta plasmas. It is found that the effects of energetic ions on linear tearing modes depend on the magnitude of fast ion gyro-radius and pressure, but don't depend on the velocity. For co-CEI, the growth rate of tearing modes decreases with gyroradius and decreases with beta below a critical value, while increases with beta above the critical value. For counter-CEI, the growth rate increases with gyroradius and beta. For the large gyroradius and low beta, the simulation results are qualitatively consistent with the analytical results [1]. It is also found that tearing mode instability can be enhanced by trapped ions.

¹This work is supported by the US Department of Energy under DE-AC02-76CH03073 and supported by National Magnetic Confinement Fusion Science Program under Gants No. 2010GB106005

Guoyong Fu
Princeton University

Date submitted: 11 Jan 2012

Electronic form version 1.4