Contribution ID: **93** Type: **Poster**

Nonlinear Dynamics of Tearing Mode Driven by Static and Rotating External 3D Fields

Thursday, 25 October 2018 08:30 (20 minutes)

The interaction of a locked tearing mode with a non-axisymmetric control field is found to be in good qualitative agreement with predictions of a nonlinear resistive MHD model [1]. Locked tearing mode islands often lead to disruptions in tokamaks. However, experiments have shown that unlocking and rotation of the island by a rotating control field (CF) can postpone or prevent a disruption [2]. The dynamics of this control has been modeled with the "AEOLUS-IT" code [1] in both tearing stable and unstable plasmas. In the tearing stable plasma, a static error field (EF) drives the island growth, which is successfully stabilized by the CF. Even in tearing unstable plasmas, the CF is predicted to reduce the nonlinearly saturated island size. Model predictions of two distinct regimes of plasma response, characterized as standing-wave and traveling-wave, are in good qualitative agreement with DIII-D observations. These results are an important step toward predictive understanding of this new approach to tearing mode control and disruption avoidance.

[1] S. Inoue et al., Nucl. Fusion 57, 116020 (2017); Plasma Phys. Control. Fusion 60, 025003 (2018).

[2] M. Okabayashi et al., Nucl. Fusion 57, 016035 (2017).

Country or International Organization

Japan

Paper Number

TH/P5-24

Primary author: Dr INOUE, Shizuo (QST)

Co-authors: Dr ISAYAMA, Akihiko (Japan Atomic Energy Agency); STRAIT, Edward (General Atomics); Dr MATSUNAGA, Go (Japan Atomic Energy Agency); Dr SHIRAISHI, Junya (National Institutes for Quantum and Radiological Science and Technology); Dr TAKECHI, Manabu (QST); Dr OKABAYASHI, Michio (Princeton Plasma Physics Laboratory); Dr IDE, Shunsuke (Japan Atomic Energy Agency); Dr TAYLOR, Zane (General Atomics)

Presenter: Dr INOUE, Shizuo (QST)

Session Classification: P5 Posters