JA-2 **Nonlinearly interacting tearing modes**

|  |  |  |  |
| --- | --- | --- | --- |
| **TG priority:** Moderate | **Start date:** 2015 | **Status:**  New | **Personnel exchange:**  No |
| **IO priority:** | **End date:**  N/A | **Motivation:** Avoid disruptions and large changes in rotation profiles | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Device /**  **Association** | **Contact**  **Person** | **2016 TG Request** | **Activity (from JET/JA spreadsheet)** | | | |
| **2016** | **2017** | **2018** | **2019** |
| CCFE | T Hender | Modelling |  |  |  |  |
| IPR | A Sen | Modelling |  |  |  |  |
| PPPL | S Jardin | Modelling |  |  |  |  |
| CNR, Italy | E Lazzaro | Modelling |  |  |  |  |
| DIII-D | R. La Haye | Data mining |  |  |  |  |
| SPC (EPFL) | O Suater | Modelling |  |  |  |  |
| USTC | P. Zhu | Modelling |  |  |  |  |
| IPP | M Maraschek | Data mining |  |  |  |  |

**Purpose:** Study of coupled (neoclassical) tearing modes to gain fundamental understanding of their nonlinear dynamics including possible phase locking and disruptive phenomena and to explore the influence of plasma rotation on such nonlinear states.

**Background:**

* Several experiments show phase locking of tearing modes e.g. JET and DIII-D show 2/1 and 3/2 NTMs can phase lock.
* A particularly significant effect of phase locking of different helicity modes can be a considerable change in the rotation profile, which in-turn can impact energy confinement.

**Results for 2015**

* Already the JA-2 group has held preliminary meetings and discussions on the priorities for this activity
* An initial linear benchmark exercise is on-going between MHD codes (FAR, CUTIE, NEAR, M3D-C1 and NIMROD)

**Plans for 2016**

* Complete the linear benchmark tests
* Start nonlinear benchmark tests of increasing complexity (going from large to lower R/a, higher beta, shaped plasmas and including plasma flows)