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Resolving Tearing Physics for the ITER Baseline at JET
RICHARD BUTTERY, EURATOM/UKAEA Fusion Association, JET-EFDA
CONTRIBUTORS TEAM — New results from JET are elucidating the physics
and exploring control of tearing instabilities for the ITER baseline scenario. In particular use of lower hybrid current drive at low magnetic fields (where deposition is expected nearer the edge) demonstrates an alternate option for mode control. At high beta this led to $\sim 15\text{-}50\%$ reductions in $3/2$ neoclassical tearing mode (NTM) amplitudes. It also improved resilience of otherwise-unheated plasmas to error field driven $2/1$ tearing modes, raising error field thresholds by $\sim 20\%$. For ITER a further concern is posed by its naturally low rotation. New JET results show a trend of $3/2$ NTMs being triggered at lower beta as neutral beam momentum injection is reduced. The most serious concern arises from $2/1$ modes locking to cause disruptions. However use of the newly installed Error Field Correction Coils shows that with suitable error field correction, this can be avoided - thus good error field correction will be needed in the low rotation plasmas of ITER. These results are part of an integrated programme to optimise the stability of the baseline scenario at JET, to be reported in full at conference.

Richard Buttery
EURATOM/UKAEA Fusion Association

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