Experimental estimation of tearing mode stability parameters (Δ′ and wc)
using high resolution 2-D ECEI data in the KSTAR plasmas

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An accurate evaluation of the tearing mode stability parameters is important to understand
the mode evolution mechanism and develop a corresponding control logic. In recent years,
much efforts have been devoted for estimation of the nonlinear classical stability index (Δ′) and
the critical width of pressure flattening (wc) based on 1-D measurement, but the accuracy was
limited to the marginal spatial resolution of the data.

In this paper, those tearing mode parameters are estimated using high-resolution 2-D ECE images of m/n =
2/1 tearing mode. The ECE images are directly compared with synthetic images from a tearing mode Te model [1, 2]
which includes Δ′ and wc. The best matched Te model yields 
\[ r_s \Delta = -1.633 \pm 1.265 \]
where \( r_s \) is \( q = 2 \) rational surface radius and \( w_c = 0.612 \pm 0.0726 \) cm, which is consistent with the ideal MHD theory. Work supported by
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References


Figure 1: The measured ECE images are compared with the synthetic ones at all tearing mode phases (t₁–t₄) to estimate Δ′ and wc.