Resistive Stability of Modeled Startup Evolution

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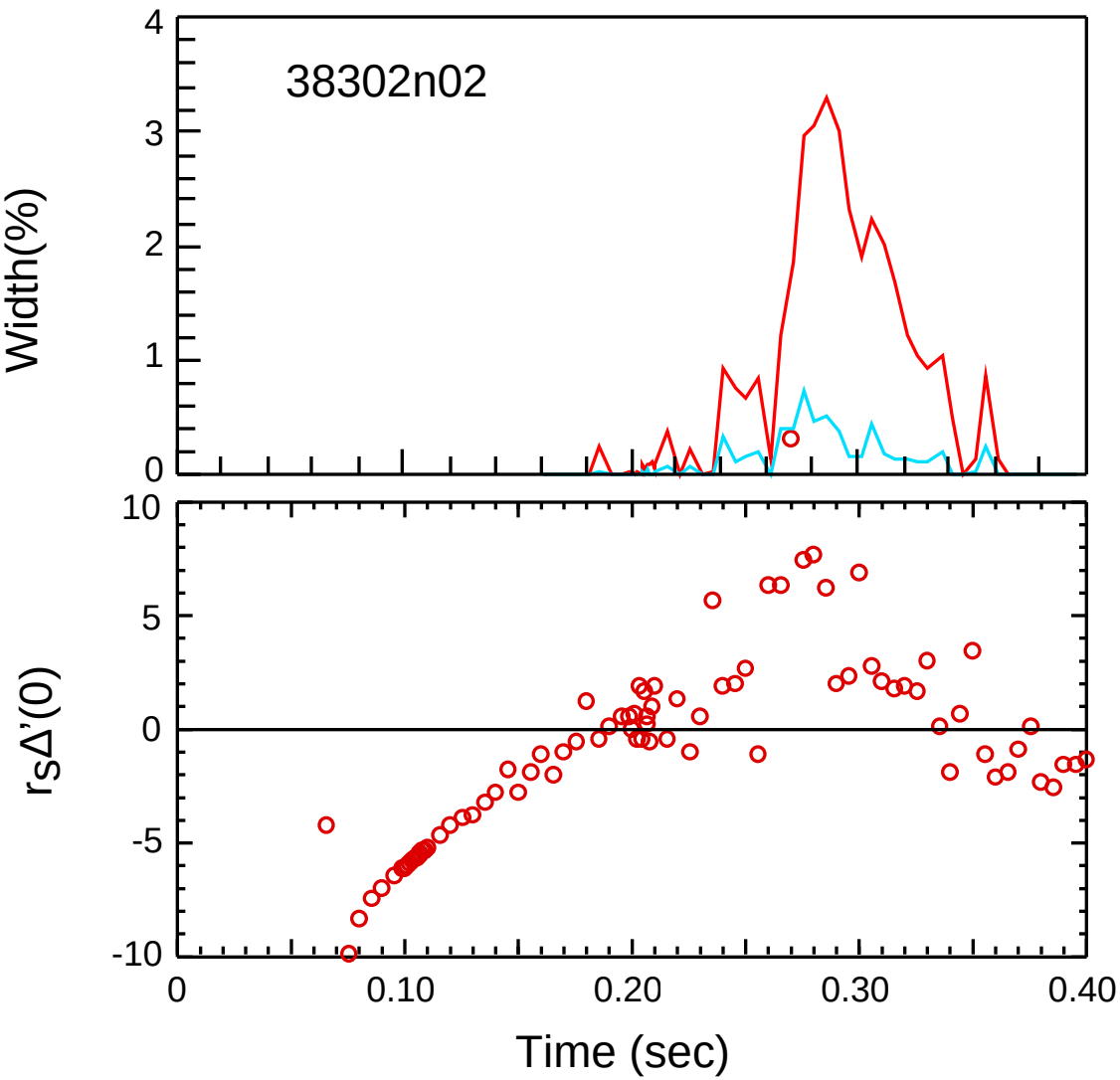
Stability calculations should be improved

- The Δ’ code is a quasi-cylindrical, zero beta model - may provide qualitative guidance.
- Neoclassical portions benchmarked in normal shear, axisymmetric experiments.
- Negative shear, shaped and non-axisymmetric not so well benchmarked
- Start-up phases were generally stable
- “Equilibrium” phase was marginal with small saturated island size.

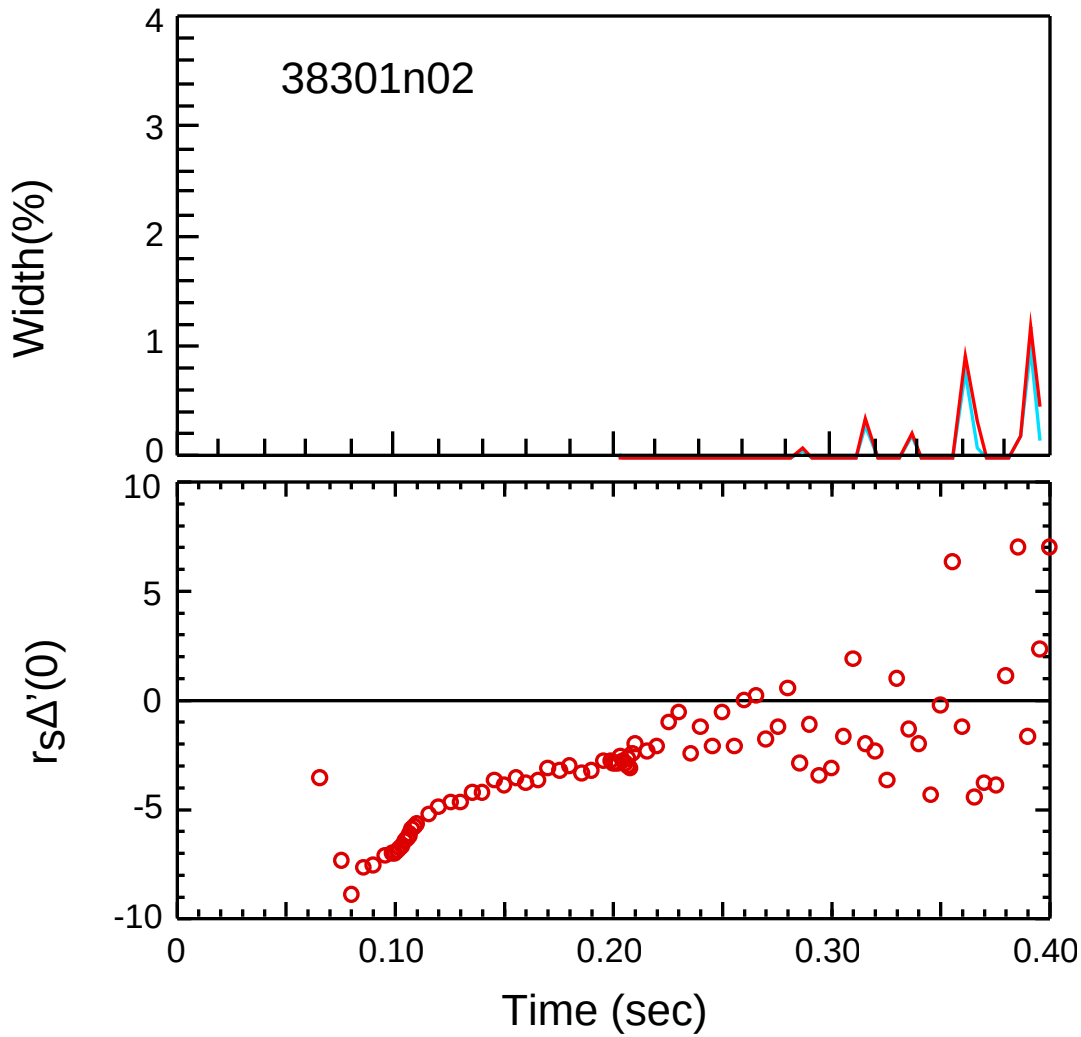
Stability evolution for 38302n02



- Red curve is resistive evolution of island size based on Δ'(w).
- Blue curve is island size evolution including neoclassical term with scale factor as from TFTR.
- Lower figure is time evolution of Δ'(0).

Stability evolution for 38301n02

- Generally more stable than 38302n02, but final equilibrium slightly more unstable.
- Island widths tend to be small.
- Neoclassical terms have weak effect on such small islands.



Summary

- Startup phase appears to be relatively stable.
- Equilibrium phase tends to be marginally stable.
- For 38302n02 the transition from startup to equilibrium was unstable with a peak (resistive) island width of ≈ 3%.
- Experimental verification of neoclassical model in reversed shear should be a high priority.
- More accurate non-axisymmetric calculations are desirable.