Status of time-varying RMP fields in NIMROD

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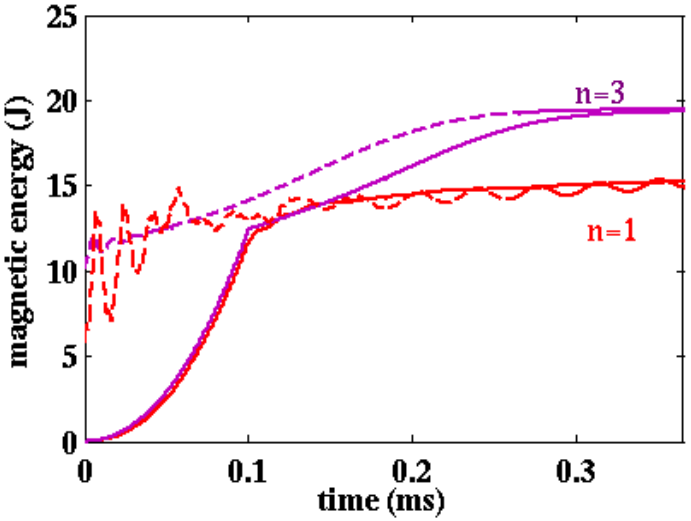
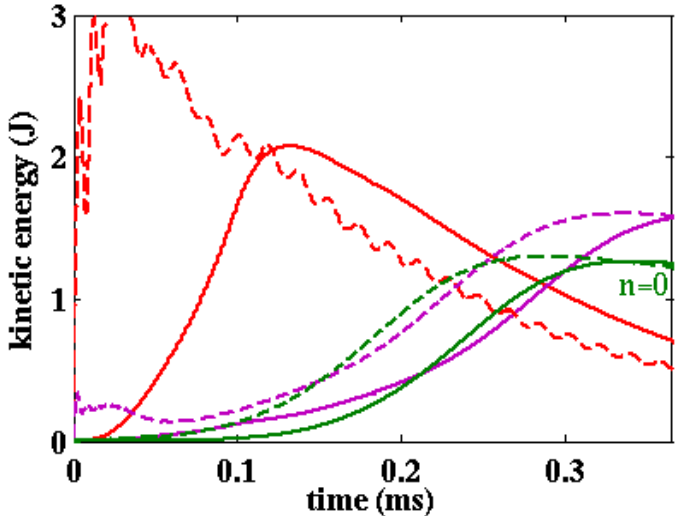
RMP field ramp has been implemented and tested

- Use the existing routines for reading in RMP fields (across the entire poloidal plane) as initial condition, then multiply by a small factor (10^{-4}), so that they are negligible at t=0
- The normal component of the boundary fields are increased self-similarly with time
- Impose a purely poloidal electric field that satisfies Faraday's Law while requiring only toroidal derivatives (easiest in NIMROD → ik)
- The applied poloidal E fields allow toroidal magnetic fields to enter the volume

Comparison of fixed amplitude RMP fields with 0.1 ms ramp for non-rotating simulation

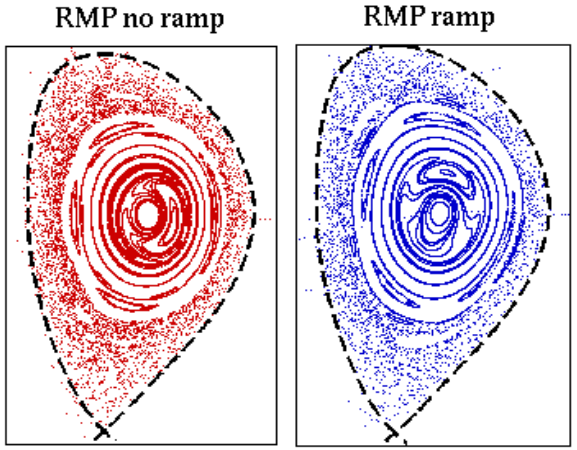


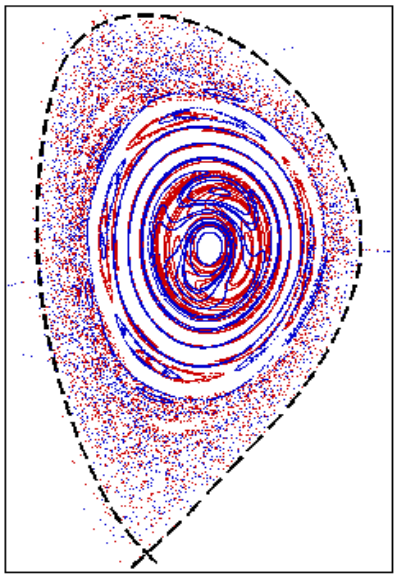


Steady state amplitude of n=1 and n=3 components is the same in ramped and fixed amplitude cases

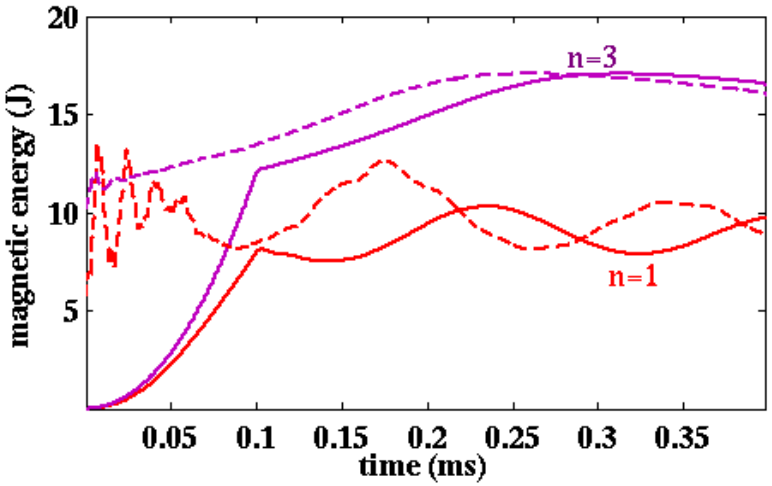
Field line puncture plots are very similar including location of stochastic region boundary

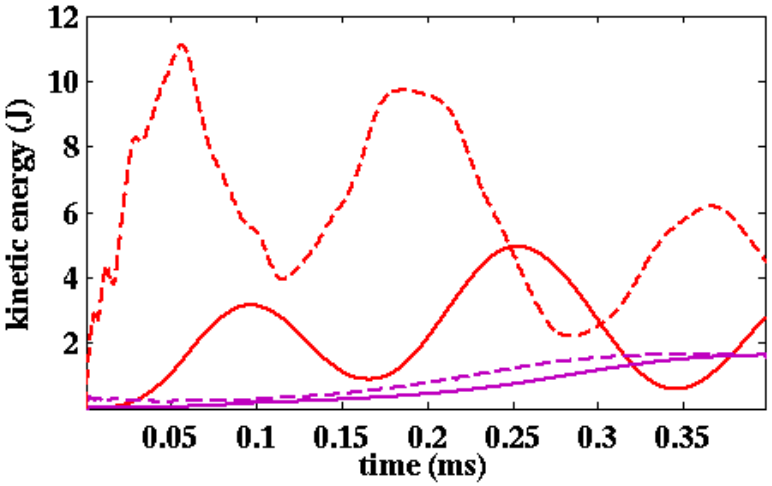
Oscillations observed in the n=1 component for fixed amplitude are not present in the ramped case





Comparison of fixed amplitude RMP fields with 0.1 ms ramp for a rotating simulation

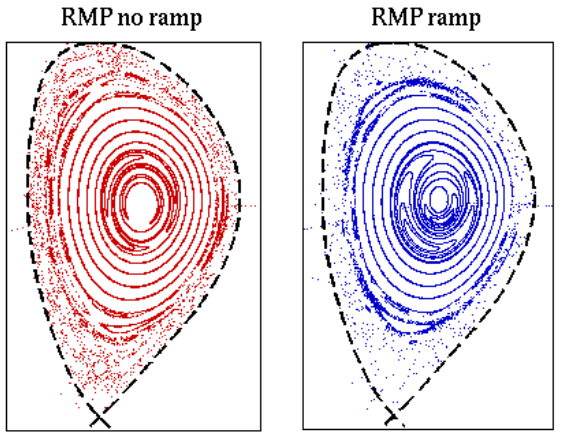


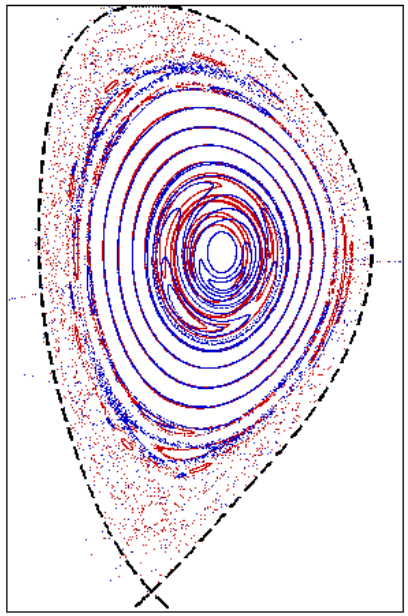


In the rotating case the 1/1 mode amplitude oscillates with or without the RMP ramp-- both have oscillation of similar amplitude and frequency

Width of 1/1 island appears larger in the ramped case, but is oscillatory in both cases

Again, both islands and stochastic regions begin at the same radii in each case





What Next?

- Some recent experiments were preformed on DIII-D (O. Schmitz) to study RMP effects on low-performance L-mode plasmas. These could be very useful benchmarking discharges for NIMROD
- Of course, we are mainly interested in RMP effects on H-mode discharges (with ELMs), and will work toward the goal of 2-fluid simulations of RMPs applied to ELM unstable equilibria