Simulation study of interaction between runaway electron generation and resistive MHD modes over avalanche timescale

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Highlight
- Multi-timescale simulation of runaway generation incl. seed generation during thermal quench (0.1-1ms) and avalanche growth during current quench (1-10ms) with $m=1$ resistive kink instability (10-100μs).
- Resistive kink radially redistributes small seed currents and limits concentration of beam current on axis. Runaway current is amplified with such a seed profile.
- Flat beam current profile over beam radius is maintained on avalanche timescale.

→ Our new simulation points out that resistive MHD mode in TQ phase is a possible mechanism governing current profile of runaway electrons.

Fig. 1 Resistive kink yields flattening of small seed currents of 0.1-1 % of ohmic current.

Fig. 2 Runaway current and $q$ profile after avalanche “inherits” profile modification to small seed currents.