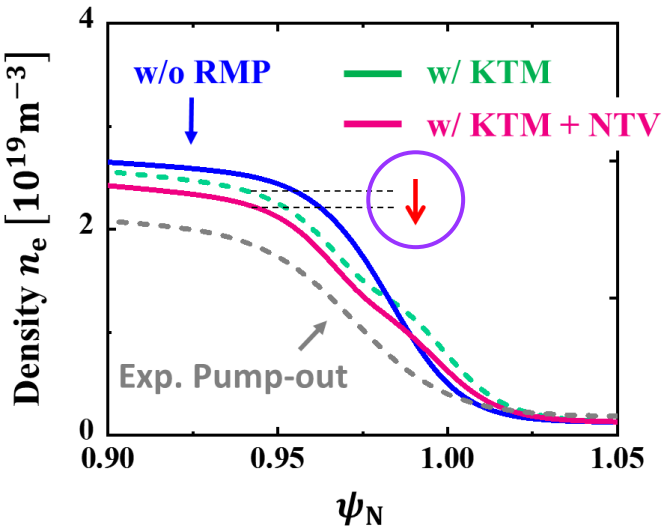
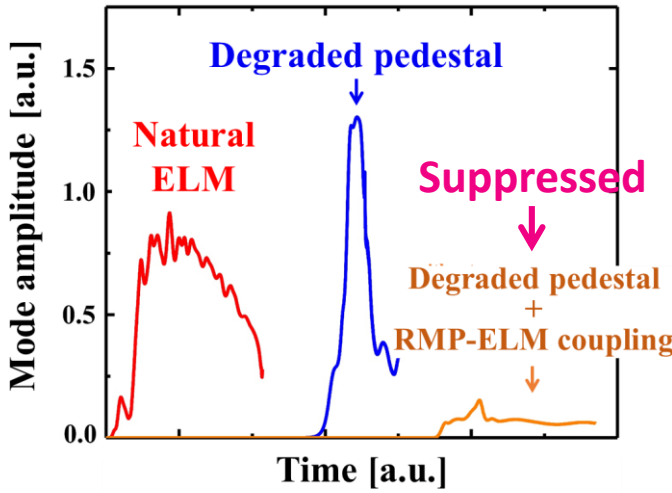
Nonlinear 3D MHD simulation is conducted to investigate the effect of RMP on the pedestal degradation ELM-crash suppression.

- **Kink-tearing response and NTV result considerable pump-out.**
  - ✓ Kink-tearing response (KTM) by RMPs results ExB particle convection at the pedestal.
  - ✓ NTV by KTM generates large radial particle flux.
  - ✓ KTM + NTV explains ~40% of Exp. pump-out.



- **ELM is nonlinearly saturated by RMPs, resulting in crash suppression.**
  - ✓ ELM crash suppression by
    - Reduced pedestal gradient.
    - Mode coupling between RMP and ELM.
  - ✓ Importance of RMP-ELM coupling in suppression.
    - Enhanced interactions between ELM harmonics.
    - Preventing nonlinear mode crash.



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