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Relevant time-scales for the assessment of Alfven Eigenmode stability and saturation[1] MARIO PODESTA, Princeton Plasma Physics Laboratory, AND NSTX-U TEAM — Energetic particles from Neutral Beam (NB) injection, fusion reactions or RF acceleration can destabilize Alfvenic instabilities (AEs) that, in turn, redistribute energetic particles thus potentially leading to degraded plasma performance. This work investigates the characteristic time scales that need to be included in the assessment of AE stability and saturation. NB-heated NSTX-U scenarios featuring simultaneous low-frequency kink modes and Toroidal AEs are used as reference. Analysis is performed through the NUBEAM fast ion module of TRANSP, enhanced by the reduced-physics kick model for fast ion transport by instabilities [M. Podest et al., Plasma Phys. Control. Fusion 59 (2017) 095008]. The results indicate that time scales from hundreds of microseconds or shorter up to several NB slowing down times need to be included for quantitative estimates of AE saturation. This suggests that time dependent simulations are generally required, instead of a simpler time-slice analysis. Remaining issues for a reduced fast ion transport and AE stability model for integrated simulations will be discussed.

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