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Modeling of potential TAE-induced beam ion loss from NSTX-U plasmas[1] DOUGLASS DARROW, ERIC FREDRICKSON, MARIO PODESTA, ROSCOE WHITE, PPPL, DEYONG LIU, UC Irvine — NSTX-U will add three additional neutral beam sources, whose tangency radii of 1.1, 1.2, and 1.3 m, are significantly larger than the 0.5, 0.6, and 0.7 m tangency radii of the neutral beams previously used in NSTX. These latter beams will also be used in NSTX-U. Here, we attempt to formulate an estimate of the propensity of the beam ions from all the various sources to be lost under a range of NSTX-U plasma conditions. This estimation is based upon TRANSP calculations of beam ion deposition in phase space, and the location of the FLR-corrected loss boundary in that phase space. Since TAEs were a prominent driver of beam ion loss in NSTX, we incorporate their effects through the following process: NOVA modeling of TAEs in the anticipated NSTX-U plasma conditions gives the mode numbers, frequencies, and mode structures that are likely to occur. Using this information as inputs to the guiding center ORBIT code, it is possible to find resonant surfaces in the same phase space along which beam ions would be able to diffuse under the influence of the modes. The degree to which these resonant surfaces intersect both the beam deposition volume and the orbit loss boundary should then give a sense of the propensity of that beam population to be lost from the plasma.

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