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He bubble growth and interaction in W nano-tendrils R.D. SMIRNOV, S.I. KRASHENINNIKOV, UCSD — Tungsten plasma-facing components (PFCs) in fusion devices are exposed to variety of extreme plasma conditions, which can lead to alteration of tungsten micro-structure and degradation of the PFCs. In particular, it is known that filamentary nano-structures called fuzz can grow on helium plasma exposed tungsten surfaces. However, mechanism of the fuzz growth is still not fully understood. Existing experimental observations indicate that formation of helium nano-bubbles in tungsten plays essential role in fuzz formation and growth. In this work we investigate mechanisms of growth and interaction of helium bubbles in fuzz-like nano-tendrils using molecular dynamics simulations with LAMMPS code. We show that growth of the bubbles has anisotropic character producing complex stress field in the nano-tendrils with distinct compression and tension regions. We found that formation of large inter-bubble tension regions can cause lateral stretching and bending of the tendrils that consequently lead to their elongation and thinning at the stretching sites. The rate of nano-tendril growth due to the described mechanism is also evaluated from the simulations.

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