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Modeling of Hydrogen Retention in Metallic Plasma Facing Components JEROME GUTERL, R. SMIRNOV, UCSD — The retention of hydrogen isotopes in the vacuum vessel of the ITER device is a critical plasma wall interaction issue for safety (tritium inventory) and operational reasons (hydrogen recycling). In particular, long-term retention of hydrogen have been observed both in the near-surface region and in the bulk of material in experiments reproducing ITER first wall conditions [1]. In this work, we present a modeling of the long-term hydrogen retention in a plasma exposed metallic walltaking into account processes both at the wall surface (material erosion, hydrogen adsorption, etc.) and in the bulk (hydrogen implantation, creation of trap sites, etc.). Using numerical simulations, the model is applied to analyze retention as a function of various parameters of the wall irradiated by hydrogen plasma for beryllium wall. Depth profiles of retained hydrogen for several ion energies as well as dependencies of retained hydrogen amount on wall temperature are obtained, showing good agreement with experimental data. The role of radiation-induced point-defects in the hydrogen retention as well as other aspects of retention are discussed in application to ITER conditions.

[1] R.A. Anderl, et al., J. Nucl. Mater. 273 (1999) 1

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