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Self-consistent 3D PIC-MC model for negative ion extraction from a hydrogen plasma source SERHIY MOCHALSKYY, AGUSTIN LIFSCHITZ, TIBERIU MINEA, LPGP - Umr 8578: CNRS - Université Paris Sud, Orsay, France — The development of a high performance negative ion (NI) source constitutes a crucial step in the construction of Neutral Beam Injector of the future fusion reactor ITER. The present knowledge of the ion extraction mechanism from the negative ion source is limited and concerns complex of magnetized plasma sheaths. 3D Particles-in-Cell electrostatic collisional code was developed, specifically designed for this system. This code, called ONIX, was used to investigate the plasma properties and the transport of the charged particles close to a extraction aperture. Results of the production, destruction, and transport of H^- in the extraction region are presented. Production of H^- is investigated via tree atomic processes: (I) electron dissociative attachment to the vibrationally excited molecules $H_2(v)$, (II) interaction of the positive ions H^+ and H_2^+ with the aperture wall and (III) collisions of the neutral gas H, H_2 with aperture wall. Influence of each process on the total extracted NI current is discussed. The formation of the plasma meniscus and the screening of the extraction field by the plasma are presented here, as well as NI trajectories.

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