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Global model of Negative Hydrogen Ion Source. SERGEY AVERKIN, JOHN CARY, THOMAS JENKINS, SCOTT KRUGER, MADHUSUDHAN KUNDRAPU, SETH VEITZER, Tech-X Corporation — A global model is applied to investigate complicated chemistry in a Negative Hydrogen Ion Source in preparation for the spatially varying simulations using USim, a multi-species fluid code. The global model includes electrons, neutral hydrogen molecules with all vibrational states ($H_2(v)$), hydrogen atoms in the first 3 electronic states (H(n)), and ground state ions (H^+, H_2^+, H_3^+, and H^-). The model includes a comprehensive set of surface and volume chemical reactions. In the global model, steady state species continuity equations, electron energy and total energy equations, heat transfer to walls, and quasineutrality are solved simultaneously in order to calculate number densities and temperatures of plasma components in the discharge over a wide range of parameters (pressures and absorbed powers). These simulations allow one to extract the most important species and reactions in a Negative Hydrogen Son Source.

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