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Impact of the Reynolds Stress on Edge Poloidal Flow Generation[1]

N. D. DANIELS, A. S. WARE, University of Montana, B. A. CARRERAS, Oak Ridge National Laboratory, D. E. NEWMAN, University of Alaska - Faribanks, C. HIDALGO, CIEMAT — A one-dimensional transport model is used to study the impact of the form of the Reynolds stress on edge poloidal flow generation during gas puffing experiments. Gas puffing at the edge of the TJ-II stellarator has been used to control the development of an edge poloidal velocity shear layer [C. Hidalgo, *et al.*, Phys. Rev. E **70**, 067402 (2004)]. In this work, a numerical transport model is used to examine for hysteresis in the development of an edge poloidal velocity shear layer due to a modeled gas puff. The transport model [D. E. Newman, *et al.*, Phys. Plasmas **5**, 938 (1998)] couples together density, ion temperature, electron temperature, poloidal flow, toroidal flow, radial electric field, and a fluctuation envelope equation which includes a shear-suppression factor and now implements a modified Runge-Kutta with adaptive time- stepping. Two different models of the Reynolds stress generation of poloidal flow are examined. The first model requires a gradient in the product of the sqare of the fluctuation amplitude and the radial electric field shear for the generation of flow. The second model requires only a gradient in the radial electric field. Both models are tested for parameters consisting with the TJ-II experiment. The impact on flow generation is discussed.

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