Modelling of Unsteady Ionized Flows Using a Velocity-Space Hybridization of DSMC and a Quasi-Particle Solver[1] GEORGII OBLAPENKO, University of Texas at Austin, DAVID GOLDSTEIN, PHILIP VARGHESE, The University of Texas at Austin, CHRISTOPHER MOORE, Sandia National Laboratories — A recently developed Boltzmann equation solver which combines DSMC and QUIPS a discrete-velocity based quasi-particle representations of the velocity distribution function in velocity space (Oblapenko et al., J. Comp. Phys 2020-109302, AIAA 2020-1063) has been shown to provide better accuracy in modelling high-velocity tails of the distribution function compared to pure DSMC, while improving upon discrete-velocity based quasi-particle methods in terms of computational cost. In the present work, the method is expanded to incorporate ionizing collisions, and numerical studies are performed to assess its accuracy and efficiency in modelling of an unsteady flow of ionized argon with a constant external electric field. Validation is performed by comparing with the Bolsig+ solver, and comparisons with pure DSMC and pure discrete-velocity methods are carried out. The influence of various hybridization-related parameters on the accuracy and efficiency of the computations is also studied

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