MULTIFLUID SIMULATIONS OF THE GLOBAL SOLAR WIND INCLUDING PICKUP IONS AND TURBULENCE MODELING

M. L. Goldstein[1] and **A. V. Usmanov**[1,2]

[1] NASA Goddard Space Flight Center, Greenbelt, MD, USA, melvyn.l.goldstein@nasa.gov
[2] Bartol Research Institute, University of Delaware, Newark, DE, USA

I will describe a three-dimensional magnetohydrodynamic model of the solar wind that takes into account turbulent heating of the wind by velocity and magnetic fluctuations as well as a variety of effects produced by interstellar pickup protons. The interstellar pickup protons are treated in the model as one fluid and the protons and electrons are treated together as a second fluid. The model equations include a Reynolds decomposition of the plasma velocity and magnetic field into mean and fluctuating quantities, as well as energy transfer from interstellar pickup protons to solar wind protons that results in the deceleration of the solar wind. The model is used to simulate the global steady-state structure of the solar wind in the region from 0.3 to 100 AU. The simulation assumes that the background magnetic field on the Sun is either a dipole (aligned or tilted with respect to the solar rotation axis) or one that is deduced from solar magnetograms.