

We study the solar wind interaction with Venus, using a new advanced multi-fluid MHD model that has been developed recently. The model is similar to the numerical model that was successfully applied to Mars (Najib et al., 2011). Mass densities, velocities and pressures of the protons and three important ionosphere ion species ( $O^+$ ,  $O_2^+$  and  $CO_2^+$ ) are self-consistently calculated by solving the individual coupled continuity, momentum and energy equations. The various chemical reactions and ion-neutral collision processes are considered in the model. The simulation domain covers the region from 100 km altitude above the surface up to  $16 R_V$  in the tail. An adaptive spherical grid structure is constructed with radial resolution of about 10 km in the lower ionosphere. The model is applied to both solar-maximum and solar-minimum conditions and model results are compared in detail with multi-species single fluid model results and VEX observations.