FLUX-ROPE STRUCTURES AT VENUS AND TITAL

H. Y. Wei, C. T. Russell, M. K. Dougherty, and J. G. Luhmann

Magnetic flux ropes, which have the structure of twisted flux tubes, are created in the ionosphere of Venus by its interaction with the solar wind and in that of Titan during its interaction with the flowing magnetized plasma corotating with Saturn. At solar maximum, the Venus ionosphere was found to be generally field free by the PVO eccentric orbiter, and flux ropes are frequently observed in the field-free region below the ionopause. During solar minimum, Venus Express detects a largely magnetized ionosphere, and flux ropes are observed both in the lower ionosphere with no background field and near the ionopause with some background field. The latter appears to be in the early stage of flux-rope formation. Similarly, the repeated low-altitude passes of Cassini through the Titan atmosphere reveal a “strongly” magnetized ionosphere and twisted magnetic field lines are observed which resemble the flux ropes in Venus’ ionosphere during formation. This paper studies the flux rope structures in the Venus ionosphere during solar maximum and the solar minimum, and in Titan’s ionosphere to understand the formation of flux ropes and what controls the orientation and helicity of flux ropes.