A rotational model of Venus

Laure Cottereau and Jean Souchay

Various models of the polar motion both in space and with respect to a body-fixed frame have been made for the telluric planets of the solar system, and of course more specifically for the motion of rotation of the rigid Earth. Since it has a very slow retrograde rotation, Venus is a very singular planet of our solar system and must show a very different rotational evolution, even at short and intermediate time scales. Here we propose to apply the theoretical model of Kinoshita (1977) for the rotation of a rigid Earth to a rigid Venus in order to study the evolution of its rotational state at short time scale. We evaluate for the first time the Oppolzer terms and the precession-nutation of the figure axis of the planet. We further compare our results with those of Kinoshita for the Earth. At last we present the periodic variations of the speed of rotation of Venus due to the tides raised on the planet. Such a study will lead to a still more realistic model of rotation of Venus including effects of the atmosphere and of the interior of the planet.