

J01M.3—Free Precession of a Planet - 2

Problem

Suppose the object can be treated as a rigid body whose principal moments of inertia obey $(I_P - I_E)/I_P = \epsilon$ to deduce the angular frequency Ω of free precession in terms of the angular frequency ω of rotation.

The reader will note that the models of the two problems are somewhat contradictory. However, they work fairly well for the Earth, whose observed free precession period of 430 days (Chandler, 1891) is about 1.6 times that as estimated above. The Chandler wobble is thought to be driven by surface wind and water; see [Science 289, 710 \(4 Aug. 2000\)](#). First evidence for free precession of a pulsar, PSR B1828-11, has recently been reported by Princeton Ph.D. I.H. Stairs, [Nature 406, 484 \(2000\)](#), with a period about 1/150 that of the above model. This discrepancy is ascribed to little understood aspects of the superfluid interior of the pulsar.