DETERMINATION OF PHOBOS GRAVITY HARMONICS, SPIN STATE, AND INTERNAL PROPERTIES;

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The Phobos volume, center of mass, inertia tensor, and gravity harmonic coefficients through degree and order six are determined by numerical integration assuming various density models for the internal structure. A simplified analytic model of the rotational motion is developed.

Eulers' equations of rotation are integrated over several revolutions of Phobos (several orbits about Mars). The gravitational torques arising from the solar tide and the Mars tide are included in the force model. Boundary conditions are imposed to obtain steady state solutions for the rotation of Phobos. Both the integrated and analytic predictions of Phobos rotation may be compared with observations including images from the Soviet Phobos Mission. This comparison provides some insight into the internal structure of Phobos.