



## Phobos' acceleration and Mars interior

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Since the discovery of Phobos and Deimos in 1877, their orbital motion has been intensively studied and many dynamical models fitting the observations have been developed. Sharpless (1945) discovered that Phobos' orbital motion shows a secular acceleration, which was later confirmed by Sinclair (1972) and Shor (1975). The acceleration is a result of the dissipation in Mars of tides caused by Phobos. As the orbital period of Phobos is smaller than the rotation period of Mars, the tidal bulge of Mars lags behind the direction to Phobos, and the torque on it causes angular momentum to be transferred from the orbital motion of Phobos to the rotation of Mars. The acceleration is related to three physical parameters that are not well-known: the Martian Love number  $k_2$  describing the response of Mars to tidal forcing, the Martian internal quality factor  $Q$ , which is a measure of the dissipation, and the mass  $m_{Ph}$  of Phobos. Nowadays the acceleration of Phobos is well known (Bills et al. 2005, Lainey et al. 2006) and it allows to further constrain Mars interior. Here, we develop interior models that are consistent with the Phobos acceleration value, recent estimates of the moment of inertia, and determinations of the tidal Love number  $k_2$ , within the uncertainties associated with these quantities and the mass of Phobos.