ESTIMATIONS OF LUNAR ELASTIC THICKNESS FROM ADMITTANCE COMPUTATIONS. S. W. Asmar[1], G. Schubert[1], and F. Nimmo[1], [1]Department of Earth and Space Sciences, University of California, Los Angeles, SAasmar@ucla.edu.

Introduction: The admittance function, calculated from the gravity and topography data in the spectral domain, can be used to compute the elastic thickness of a terrestrial planet, the effective thickness of the part of the lithosphere that can support elastic stresses over long time scales. The general form of the transfer function is given by the following equation [1] where k is the wavenumber, g is the gravitational acceleration at the surface, ρ_c is the density of the crust, ρ_w the density of the overlying fluid, ρ_m the density of the upper mantle, E Young's modulus and σ Poisson's ratio for the elastic layer of thickness T_e, z the height of the surface where the gravity measurements are made, t_c the mean crustal thickness, a is the radius of the planet and ρ_p its mean radius:

$$Z(k) = \frac{3g(\rho_c - \rho_w)}{2a\rho_p}\exp(-kz)\left[1-\exp(-kt_c)\left(1+\frac{ET_e^3k^4}{12(1-\sigma^2)(\rho_m-\rho_c)g}\right)^{-1}\right]$$

This equation is modified to account for sphericity if the region of interest is comparable in the size to the planetary radius.

Application to Moon: Admittance has been applied extensively in recent years to Venus and Mars due to new available data. Recent updates by Lunar Prospector to the historical dataset of lunar gravity provide for a very high resolution field, especially for the near side of the Moon [2]. Lunar topography from the Clementine lidar was augmented by radio occultations in the polar regions to provide a global field [3,4]. In the Cartesian admittance approach, the gravity data for certain regions of interest, such as South Pole Aitken, are identified as rectangular sections and the data are derived from either the spherical harmonic expansion or the line-of-sight accelerations. The computations require assumptions about the properties of the moon and various signal processing techniques of windowing the data, to which the results are highly sensitive. Comparisons of these parameters will be presented along with applicable results. Geophysical interpretations will also be presented of the elastic thickness for selected regions of the moon.

References: [1] McKenzie, D. (1994) *Icarus, 112,* 55–88 [2] Konopliv, A. S., S. W. Asmar, E. Carranza, D. N. Yuan, and W. L. Sjogren, (2001) *Icarus,* 150, 1-18. [3]Asmar, S., G. Schubert, W. Moore, A. Konopliv, D. Smith, & M. Zuber (2000) *EOS Trans. AGU* 81 (48), Fall Meet Suppl., Abstract G71A-04. [4] Asmar, S and G. Schubert, In Heather D. J. (ed) *New Views of the Moon, Europe: Future Lunar Exploration, Science Objectives, and Integration of Datasets*. ESTEC RSSD, Noordwijk.