

Tangential YORP in Complex Geometries

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Multiple prior works have suggested that the Yarkovsky-O'Keefe-Radzievskii-Paddack (YORP) effect meaningfully alters the orbital motion of asteroids. The emission of thermal radiation coupled with the scattering of solar radiation off of the asteroid produces a small thrust that can alter the spin state of the body. In addition to normal YORP (NYORP), which is caused by large scale irregularities in asteroid shape, tangential YORP (TYORP) is caused by heat conductivity of stones on the asteroid surface and can also contribute to the overall YORP effect. To date, the theoretical contribution of the TYORP effect upon asteroid spin has been simulated for relatively simple geometries. In this work we present a method for simulating complex surface topologies to better understand the contribution of TYORP. Our method involves the use of computer 3D modelling environments and heat equation code to simulate light propagation and heat conductivity across complex scenes, thereby allowing the modelling of a variety of complex surface conditions.