Abstract Submitted
for the APR18 Meeting of
The American Physical Society

Physics of celestial scale dumbbells LEONARDO GOLUBOVIC, West Virginia Univ, STEVEN KNUDSEN, West Virginia University — The physics of manmade celestial scale objects, such as Space Elevators connecting the Earth with outer space, has recently attracted increased attention of diverse researchers. In this study we address basic physics of celestial scale dumbbells such as the Analemma Tower suspended from an asteroid orbiting the Earth (Clouds AO, 2017). Celestial dumbbells involve two large masses (top and bottom) connected by strings. The two masses move geosynchronously with the Earth, with the bottom mass remaining close to the Earth and the top mass moving above the Earth's geosynchronous satellite orbit. Appealing examples of celestial scale dumbbells are untied Rotating Space Elevators [S. Knudsen, S. and L. Golubovic (2015). Physics of untied rotating space elevators. European Physical Journal Plus 130, 243.]. Celestial scale dumbbells exhibit rich and interesting nonlinear dynamics caused by instabilities of dumbbell geosynchronous motion discussed in this study. We point out that celestial scale dumbbells are physically feasible (in terms of nowadays available materials strengths) on dwarf planets in the main asteroid belt of the Solar system such as Ceres.

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Date submitted: 11 Jan 2018 Electronic form version 1.4