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Modeling the Physics of Sliding Objects on Rotating Space Elevators and Other Non-relativistic Strings LEONARDO GOLUBOVIC, STEVEN KNUDSEN, West Virginia University — We consider general problem of modeling the dynamics of objects sliding on moving strings. We introduce a powerful computational algorithm that can be used to investigate the dynamics of objects sliding along non-relativistic strings. We use the algorithm to numerically explore fundamental physics of sliding climbers on a unique class of dynamical systems, Rotating Space Elevators (RSE) [L. Golubović and S. Knudsen, Europhys. Lett. 86**,** 34001 (2009); S. Knudsen and L. Golubović, Eur. Phys. J. Plus 129, 242 (2014), ibid., 130, 243 (2015)]. Objects sliding along RSE strings do not require internal engines or propulsion to be transported from the Earth's surface into outer space. By extensive numerical simulations, we find that sliding climbers may display interesting non-linear dynamics exhibiting both quasi-periodic and chaotic states of motion. While our main interest in this study is in the climber dynamics on RSEs, our results for the dynamics of sliding object are of more general interest. In particular, we designed tools capable of dealing with strongly nonlinear phenomena involving moving strings of any kind, such as the chaotic dynamics of sliding climbers observed in our simulations.

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