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Leveraging GPU accelerated computing to restore credibility to the giant impact hypothesis

Bryant Wyatt
Tarleton State University, USA

The giant-impact hypothesis is the dominant theory as to how the Earth-Moon system was formed, but angular momentum concerns have cast a shadow on its validity. Computer generated impacts have been successful in producing virtual Earth-Moon systems that possess many of the properties of the observed system, but when tasked with addressing the isotopic similarities between the Earth and Moon they result in systems with excessive angular momentum. Evection resonance between the Moon and the Sun has been put forth as a means of removing the excess angular momentum, but this reasoning was rejected by the Royal Society at a special session called to discuss the origin of the Moon. Here we show how to use impactor spins to create an impact that preserves all the favorable aspects of previous simulations, and produces an Earth-Moon system with the correct angular momentum. Evection resonance is not needed. All the work is done on inexpensive NVIDIA GPUs, demonstrating how supercomputing and computational astrophysics has come to the masses.

Biography

Bryant Wyatt is a Professor of Mathematics at Tarleton State University. He is the Director of the University's High Performance Computing Lab. The work presented here was done as a collaborative project between him and a group of students from the mathematics, computer science and physics departments.

wyatt@tarleton.edu

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