Jacob Leboeuf
Computer Graphics II
Dr. Haim Levkowitz
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Summary

This article discusses modeling the force and torque on a spacecraft from solar radiation pressure through ray-tracing on GPUs. The purpose of such modeling is to demonstrate how knowing such information can resolve complex spacecraft structures more accurately and efficiently, ensuring the safety and lack of failure for this technology when put to use. The author's note that their approach diffuses reflection on top of ray-surface interactions, directly generating ray continuation based upon the spacecraft's bidirectional reflectance distribution function (BRDF) of its surface material. Through C++ and OpenCL, the authors' approach is implemented and executed on a consumer grade GPU, and provides necessary validation of the model as well. The authors look to accommodate thermal radiation effects within their model, and even look to implement more complex surface material BRDF representation in the future.