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Simulator Technology of the Gravity Probe-B Mission¹ DAVID HIPKINS, Stanford University, ROBERT BRUMLEY, Boeing Company, YOSHIMI OHSHIMA, THOMAS HOLMES, Stanford University — The Gravity Probe B mission relied on simulators extensively both in the development and operational phases. They played a critical role in the mission's overall success. The primary simulator was the Integrated Test Facility (ITF) built by Lockheed-Martin. This simulator was assembled to provide spacecraft dynamics simulation as well as flight software validation and verification. There were also subsystem simulators that played equally important roles. The gyroscope suspension system team developed and built a hardware-in-the-loop gyroscope simulator designed to be able to operate over 10 orders of magnitude in force domain. This simulator evolved during on-orbit operations into a state of the art drag-free simulator. Simulated sensors for the SQUID readout system, telescope readout system and even an artificial star to test the performance of the telescope optics were used extensively for qualification tests prior to launch. One of the more important lessons learned is for missions where the spacecraft to payload coupling becomes the greatest challenge, simulators of the future need to be designed with coupled interfaces and these simulators must be employed early in the design and build phase of the mission.

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