

ASTRODYNAMICS SYMPOSIUM (C1)
Attitude Dynamics (2) (2)

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EXPERIMENTAL DEMONSTRATION OF 3-DOF CAPABILITIES OF A TILTED WHEEL USING AN
AIR-BEARING TABLE**Abstract**

Previous research has explored the concept of a Tilted Wheel, a newly proposed type of inertial actuator that can generate torques in all three principal axes of a rigid satellite using only a spinning wheel and a simple tilt mechanism. The tilt mechanism tilts the angular momentum vector about two axes providing two degree of freedom control, while variation of the wheel speed provides the third. The equations of motion of the system lead to a singularity-free system during nominal operation avoiding the need for complex steering logic. This paper describes the hardware design of the Tilted Wheel and the experimental setup behind an air bearing table used to test it. Experimental results from the air bearing table are provided with the results depicting the high performance capabilities of the proposed actuator in torque generation.