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Passivity-based control applied of a reaction wheel pendulum: An IDA-PBC approach
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Abstract
This paper presents the development of a nonlinear controller for the reaction wheel pendulum (RWP) via an interconnection and damping assignment passivity-based control (IDA-PBC) approach. The IDA-PBC approach works with the port-Hamiltonian open-loop dynamics of the RWP to propose a nonlinear controller that preserves the Hamiltonian structure in closed-loop by guaranteeing stability properties in the sense of Lyapunov. Numerical results confirm the theoretical development presented throughout simulations in Simulink package from MATLAB. Comparison with a Lyapunov-based approach is also provided. © 2019 IEEE.

Index Keywords
Hamiltonians, MATLAB, Pendulums, Stability, Wheels; Hamiltonian structures, Interconnection and damping assignment, Non-linear controllers, Open loop dynamics, Passivity based control, Reaction wheel pendulum, Stability properties, Theoretical development; Controllers

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