Mechanical Engineering Master's Defense

Using the Phase Angle Oscillator Controller for Hopping Robots

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abstract

As the robotic industry becomes increasingly present in some of the more extreme environments such as the battle field, disaster sites or extraplanetary exploration, it will be necessary to provide locomotive niche strategies that are optimal to each terrain. The hopping gait has been well studied in robotics and proven to be a potential method to fit some of these niche areas. There have been some difficulties in producing hopping controllers that maintain robust, steady state limit cycles, which are disturbance resistant.

The following thesis will discuss a controller which has shown the ability to produce these desired properties. A phase angle, oscillator controller is shown to work remarkably well, both in simulation and with a one degree of freedom robotic test stand.

Work was also done with an experimental quadruped with less successful results, but which did show potential for stability. Additional work is suggested for the quadruped.

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