Energy based modeling and control of a dielectric elastomer cardiac assist device

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Résumé

This contribution is concerned with the port Hamiltonian modeling and control of a dielectric elastomer actuator used for a cardiac assistance device. The proposed non-linear model is identified under different applied voltages and pressures, and validated against experimental results with relative errors of less than 0.3%. Subsequently, two passivity-based controllers are designed to stabilize the actuator at a desired position. The first controller is designed using control by interconnection. The second one considers additional integral action to reject disturbances while preserving the passivity of the closed-loop system.

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