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Modeling and Parameter Estimation of an Actuator for Prosthetic Joints

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Abstract

A mathematical model was developed for a linear actuator to be used in a powered leg prosthesis. The model consists of a differential equation relating motor voltage, external force and velocity. All model parameters were known from manufacturer's data, except inertia and friction. A numerical simulation was prepared to estimate these parameters from experimental data. Experiments were conducted and a numerical search was performed to arrive at parameter values that closely fit the data. The mathematical model will be used in subsequent control development work.