The process of developing the controls for the system was as follows: develop equations of motion (EOM) for the system, derive transfer functions (TF) from the EOM, perform Laplace transforms on the TF, and develop PID control for the system.

To begin the control theory the following assuming are foundational:

* Pilot is self-correcting and self-balancing;
* Pilot and suit are rigidly attached at the torso;
* Suit legs are capable of operating and moving independently;

Based on these assumptions it is possible to treat each leg as separate, and symmetrical but independent control problems. By adding the design constraint that all actuators and limbs shall lay on the same rotational axis, it is possible to treat each leg as a 3 DOF RR manipulator. The generalised equation relating the torque of the system it is resulting accelerations and velocities is given by kt:

Where

* vector of applied generalised forces
* manipulator mass matrix
* generalised accelerations of the system
* vector of centrifugal and coriolis forces
* vector of gravity forces

To find the PID control parameters for each joint

Develop Equations of Motion

The generalised equation relating the torque of the system it is resulting accelerations and velocities is given by kt:

Where

kt

kt

Develop Transfer Function