Project Phase 2: Rover Dynamical Analysis

MEEN 357-505

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5.2, Task 2: Visualizing the Terrain

Chart, line chart

Description automatically generated

The figure above illustrates the angle of the terrain as a function of distance the rover has traveled. The greater the y-axis value, the steeper the incline. Points of the graph are interpolated, or connected with a cubic spline approximation. The angle between the known points can be extrapolated using the graph. However, since we assumed a cubic fit, we cannot be certain that this that the interpolations are accurate.

5.5, Task 5: Visualizing Motor Efficiency

Chart, line chart

Description automatically generated

The figure above shows the efficiency as a function of torque. Points of the graph are interpolated or connected with a cubic spline approximation. The efficiency between the known points can be extrapolated using the graph. However, since we assumed a cubic fit, we cannot be certain that that the interpolated values are accurate.

5.8 Task 8: Rover Simulation

Chart

Description automatically generated with medium confidence

The figure above shows how time affects position, velocity, and power output of the rover. As the velocity decreases, the rover is traveling upslope and therefore requires more power. This explains why the velocity appears as a mirror to the power graph.

5.9 Task 9: Analysis of Energy Needs



Text

Description automatically generated

The energy of the battery is less than the energy of the energy consumed since the output of the test program was negative. The energy consumed was calculated by using the “battenergy” function with the inputs sourced from the telemetry. The code above shows the method for proving that the provided battery would not be sufficient.