System Model Parameters

Constants

- Universal Gas Constant
- Emmissivity of Collector, ε
- Stefan Boltzmann Constant, σ

Environmental

- Solar Insolation, I_{Sun}
- Solar Heat, Q_{Sun}

Collector

- Radius of Curvature-Collector, $R_{Curvature}$
- Surface Reflectance-Collector, $\rho_{Surface}$

Operating

- Engine Piston Speed, ω_{Piston}
- Generator Speed, $\omega_{Generator}$

Thermal

- Hot Temperature, T_H
- Cold Temperature, T_C
- Ambient Temperature, T_{amb}
- Molecular Mass of Fluid, $M_{Working\ Fluid}$
- Coeff. of Conduction-Regenerator, $k_{Regenerator}$
- Coeff. of Conduction-Heat Sink, $k_{Heat\ Sink}$
- Coeff. of Conduction-Cylinder, $k_{Cylinder}$
- Coeff. of Convection-Air, h_{air}

Mechanical

- Cylinder Diameter, $D_{Cylinder}$
- Cylinder Length, $L_{Cylinder}$
- Piston Length, L_{Piston}
- Link Length, $L_{Linkage}$
- Bearing Friction, $\mu_{Bearing}$
- Seal Friction, μ_{Seal}
- Flywheel Diameter, $D_{Flywheel}$
- Flywheel Inertia, $I_{Flywheel}$

Electrical

- Wire Losses, P_{Wire}
- Motor Inertia, I_{Motor}

Output

- Cylinder Acceleration, X_dot cyl
- Link Acceleration, x_dot Link
- Flywheel Acceleration, x_dot Flywheel
- Motor Acceleration, x_dot generator
- Heat Lost, Q_dot Lost
- Charging Power, Ah
- Output Power, W_dot Gained

Non Dimensional Parameters

- Reynolds Number, Re
- Nusselt Number, Nu

Dependent Parameters

- System Weight
- Link Stress
- Pin Stress
- Bearing Stress
- Cylinder Wall Thickness
- Flywheel Diameter and Mass
- Wrist Pin Diameter
- Wrist Pin Length
- Pin Retention
- Drive Key Size

Design Parameters-For Build, Not Model

- Seal Material (Thermal Limit, Sealing Pressure, Frictional Effect)
- Heat Sink Size, Weight and Fin Configuration
- Linkage Cross Section (Column Buckling, Weight, Aerodynamic Concerns)
- Linkage Bearing Material (Strength, Thermal Limit, Strength)
- System Starting Inertia (Overcoming From Dead Start)