

## Abstract

This thesis presents a study of indicated power estimation of a single cylinder beta-type Stirling engine using second order analysis by modifying the Ureili's program. The engine specification and the test data of GPU-3 engine from the Lewis research center is used as a reference. Helium is used as a working fluid at the mean pressure of 5.52 MPa, the heater gas temperature of 649C and the cooling water inlet temperature of 13C. The Ureili's program is modified by reconsidering the temperature rise in the cooler and the regenerator's friction coefficient. The friction coefficient equation for regenerator is obtained by backward calculation from the test data. The modified program reaches 5% error in indicated power and 15% error in heat input.

The modified program is utilized in optimization of driving mechanism. Under the defined parameter, the optimization process suggests new geometry that is expected to produce 30% increase in indicated power over the original GPU-3 engine.