

Numerical and experimental investigation of a small gas turbine combustor

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Summary:

The paper presents the numerical and experimental investigations of internal combustion in a small gas turbine GTM-140. The non-premixed model of kerosene combustion and discrete phase model with evaporated fuel drops are implemented in the FLUENT solver. The numerical results are validated on the turbine engine test stand. It is equipped with pressure sensors, thermocouples, flow sensors, inductive rotational speed sensor and thrust measuring system. Pressure and temperature sensors are placed equally spaced along the circumference in several parts of the engine: compressor outlet, diffuser outlet, combustion chamber outlet and turbine outlet.

The analysis presents a relationship between values of mass flow rates and pressure as a function of rotational speed. The impact of total pressure losses is discussed. The distribution of holes in the flame tube, which is important for the temperature contours at the inlet to the turbine rotor, is taken into consideration.