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Extended Abstract

Gas turbine jet engine (GTJE)

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Abstract

Gas turbine engines (GTE) have a number of advantages over reciprocating internal combustion engines. They have greater power density, full expansion of the working body (WB), greater resource due to balance and minimization of friction surfaces, less consumption of lubricating fluids, low requirements for fuel quality regardless of octane number, less time to prepare for launch. Meanwhile, GTE to yield the piston engines for fuel efficiency. This is determined by the insufficiently high thermal efficiency the ratio of useful work to the heat consumed due to the limiting temperature at the turbine inlet due to insufficient heat resistance of the turbine blades. To increase thermal efficiency by increasing the temperature of the WB, the concept of a gas turbine jet engine was proposed. This device is a Segner type wheel with a rotating combustion chamber (CC) and tangentially mounted nozzles. Torque is created by the reaction force of the jets flowing from the nozzles. The absence of turbine blades allowed increasing the temperature of the WB. The full expansion of the WB occurs in the system of rotors installed coaxially with the CC, and also equipped with jet nozzles. The cooling of the CC and the nozzles is carried out by a liquid metal coolant circulating due to centrifugal forces. Estimates show that at a WB temperature corresponding to the combustion temperature of a stoichiometric air-fuel mixture, the thermal efficiency in the design mode is 0.47; the specific fuel consumption is 0.25 kg/kWh, which is comparable with the corresponding figures for piston engines. The device was protected by a Russian patent for an invention and a German patent for a utility model. It is assumed that the engine can be used in hybrid vehicles to charge batteries. It requires the creation of a prototype engine for the experimental study of its characteristic.

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