

Air-to-air heat exchangers of the high-pressure turbine rotor cooling system in modern aviation turbojet

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The article considers efficiency of design options for an air-to-air heat exchanger(HE) installed in the bypass section of the turbofan engines, its modifications, differing in shape and diameter of the tubes, orientation of tube bundles in the axial or circumferential direction, etc. All calculations were performed using ANSYS CFX program and the preferred designs were chosen according to the level of temperature drop of cooling air, pressure loss inside the tubes and in the bypass section of the aircraft engine. A constructive scheme has been developed for two in-line tubular air-to-air heat exchangers in which the air drawn from the intermediate stage and behind the high-pressure compressor is simultaneously cooled. The scientific novelty is the use of the concept of micro laminarizers installed inside the tubes on a smooth wall, which allows to intensify the heat exchange inside the tubes with a minimal increase in pressure losses of the cooled air.

Keywords: *air-to-air heat exchanger, heat transfer coefficient, air cooling system efficiency, cooling and cooled air, tube bundles*

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