

Process of Dimensioning Small Type Annular Combustors

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Abstract : Current and future applications of small gas turbine engines annular type combustors have requirements presenting difficult disputes to the combustor designer. Reduced cost and fuel consumption and improved durability and reliability as well as higher temperatures and pressures for such application are forecast. Coupled with these performance requirements, irrespective of the engine size, is the demand to control the pollutant emissions, namely the oxides of nitrogen, carbon monoxide, smoke and unburned hydrocarbons. These technical and environmental challenges have made the design of small size combustion system a very hard task. Thus, the main target of this work is to generalize a calculation method of annular type combustors for small gas turbine engines that enables to understand the fundamental concepts of the coupled processes and to identify the proper procedure that formulates and solves the problems in combustion fields in as much simplified and accurate manner as possible. The combustion chamber in task is designed with central vaporizing unit and to deliver 516.3 KW of power. The geometrical constraints are 142 mm & 140 mm overall length and casing diameter, respectively, while the airflow rate is 0.8 kg/sec and the fuel flow rate is 0.012 kg/sec. The relevant design equations are programmed by using MathCAD language for ease and speed up of the calculation process.

Keywords : design of gas turbine, small engine design, annular type combustors, mechanical engineering

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