

Title	A study of design calculation for gas turbine combustors
Sub Title	
Author	国広, 重男(Kunihiro, Shigeo)
Publisher	慶應義塾大学藤原記念工学部
Publication year	1967
Jtitle	Proceedings of the Fujihara Memorial Faculty of Engineering Keio University (慶應義塾大学藤原記念工学部研究報告). Vol.20, No.81 (1967. ) ,p.188(12)- 188(12)
JaLC DOI	
Abstract	
Notes	Summaries of Doctor and Master Theses
Genre	Departmental Bulletin Paper
URL	<a href="https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001004-00200081-0012">https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001004-00200081-0012</a>

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# A Study of Design Calculation for Gas Turbine Combustors

Shigeo KUNIHIRO\*

In the design of combustors for gas turbines, it is necessary to be able to predict the combustor aerothermodynamic characteristics from the combustor geometry and operating conditions. This report describes an analytical method for calculating the combustor pressure distribution and liner air flow distribution along the combustor axis.

The fundamental equations of continuity, momentum and energy are obtained at each section that the combustor is divided into arbitrarily. The principal assumptions required are as follows: (1) The actual flow can be approximated with sufficient accuracy by one dimensional equation. (2) The liner air jets mix instantaneously with the liner gas stream. (3) Heat transfer between the annulus and liner gas stream is neglected. The fundamental equations are arranged in a step-wise manner. The calculation is performed by electronic computer with provision for use of empirical characteristics. After the calculation of one cycle in a step by step method, if the combustor exit value does not agree with pre-established condition, then the calculation is reiterated. When the check agrees within a predetermined tolerance, the solution is complete.

By application of this procedure over-all-development times and cost of engines will be reduced.

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