DEDICATION

To my colleagues, students and researchers.

ACKNOWLEDGEMENT

First of all, giving thanks to Allah,

Words fail to describe my gratitude for my supervisor

Dr. Ali Mohammed Hamdan Adam

For his Guidance and help during my research at Sudan University of Science and technology.

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Abstract

In this research, a cycle model of a gas turbine power plant with the effect of intercooler along with a detailed parametric study. The effects of parameter on the power output, compression work, specific fuel consumption and thermal efficiency are evaluated. The study shows that, the implementation of inter-cooling increases the power generating efficiency. Inter cooler gas turbine cycle is analyzed. Different effected parameters are simulated, including different compressor pressure ratios, different ambient temperature; air fuel ratio and turbine inlet temperature, were analyzed. The obtained results are presented and analyzed. Further increasing the cyclepeak temperature ratio and total pressure ratio can still improve the performance of the intercooled gas turbine cycle.

تـجـــريـــــــــــــــــــــــــــــــد

هذا البحث يتناول دراسة لخواص نموذج لدورة توربين غازي في محطة توليد قدرة مع تاثير المبرد البيني. تم حساب وتقييم تأثير الخواص على القدرة الخارجة، شغل الانضغاط، الاستهلاك النوعي للوقود والكفاءة الحرارية.

في هذه الدراسة وجد أن وضع المبرد البيني يزيد من كفاءة القدرة المتولدة، تم محاكاة وتجميع أثر الخواص المختلفة متضمنةالاختلاف في نسب الانضغاط للضاغط، الاختلاف فيدرجة حرارة الهواء ودرجة الحرارة الداخلة للتوربين.

تم تحليل النتائج المعطاة التي أدت إلى أن نسبة الانضغاط الكلية يمكن أن تطور من أداء المبرد البيني لدورة التوربين الغازي.

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Abbreviations & Symbols

A/Abbreviations:

GT	Gas turbine
C.C	Combustion chamber
C	Compressor
H.P.C	High pressure compressor
L.P.C	Low pressure compressor
C_p	Specific heat at constant pressure
C_{pa}	Specific heat of air at constant pressure
H	Enthalpy
r_p	Pressure ratio
SFC	Specific Fuel Consumption
R	Gas constant
T	Temperature
C.R	Compression Ratio
C.V	Calorific Value
NO_X	Oxides of Nitrogen
H.E.E.	Heat exchanger effectiveness.

B/ List of symbols:

Symbol	Function	Unit
SFC	Specific fuel consumption	kg/kW.h
C.V	Calorific Value	kJ/kg
$\dot{m}_f$	Fuel mass flow rate	kg/s
η_{th}	Thermal efficiency	%
η_c	Compressor efficiency	%
E	Inter-cooler effectiveness	
P	Pressure	KPa
T	Temperature	K

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