TABLE OF CONTENTS

Chapters:

1. INTRODUCTION

LIST O F TABLE

LIST OF FIGURE

Nomenclature

A	Constant
B	Constant
C_p	Molar specific heat (kJ $kmol^{-1}$ K^{-1})
C_{pg}	Specific heat of combustion gas (kJ $kmol^{-1}$ K^{-1})
E	Reversible open circuit cell voltage (V)
ex	Molar specific exergy (kJ $kmol^{-1}$)
$\dot{E}x$	Total exergy rate (kW)
F	Faraday's constant
G^0	Gibbs free energy (kJ $kmol^{-1}$)
h	Enthalpy (kJ $kmol^{-1}$)
i	Current density (Amp cm^{-2})
i_0	Exchange current density (Amp cm^{-2})
I	SOFC current (Amp)
$\dot{I}$	Irreversibility rate (kW)
$\dot{m}_g$	Mass flow rate of combustion gases (kg s^{-1})
$\dot{m}_s$	Steam generated (kg s^{-1})
$\dot{m}_w$	Water flow rate (kg s^{-1})
$\dot{n}$	Molar flow rate (kmol h^{-1})
n_e	Number of electron
p	Partial pressure of constituent gases (bar)
p_0	Reference pressure (bar)
R	Universal gas constant (8.3143 kJ $kmol^{-1}$ K^{-1})
S	Entropy (kJ $kmol^{-1}K^{-1}$)
T	Temperature (K)
V	Actual cell voltage (V)
V_{act}	Activation over-potential (V)
V_{conc}	Concentration overpotential (V)
V_{ohm}	Ohmic overpotential (V)
$\dot{W}_{net}$	Net power (kW)

X	Mole fraction

Greek Letters

β	Transfer coefficient
ρ	Specific resistivity (ohm cm)
δ	Thickness (cm)
η	Efficiency (%)

Subscripts

av	Average
ch	Chemical
g	Combustion gases
gen	Generator
s	Isentropic
tm	Thermo-mechanical

Abbreviation

AC	Air compressor
AFR	Air flow rate
AR	Air recuperator
BFP	Boiler feed pump
BP	Boiler pressure
CC	Combined cycle
COND	Condenser
CPR	Compressor pressure ratio
DE	Differential evolution
FC	Fuel compressor
FFR	Fuel flow rate
FR	Fuel recuperator
GA	Genetic algorithm
GT	Gas turbine
GTIT	Gas turbine inlet temperature

HP	High pressure
IP	Intermediate pressure
LP	Low pressure
OWH	Open water heater
PR	Pre-reformer
SOFC	Solid oxide fuel cell
ST	Steam turbine
STIT	Steam turbine inlet temperature
TER	Turbine expansion ratio