CHAPTER 1

ENERGY ANALYSIS OF TWO STROKE ENGINES WITH A QUASI-REALISTIC THERMODYNAMIC MODEL APPROACH

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1. INTRODUCTION

As is known, internal combustion engines are based on the principle of obtaining high pressure in the cylinder by burning the fuel-air mixture. An internal combustion engine is formed by the sequential repetition of successive processes, that is, by the continuous occurrence of cycles. These processes are the intake of the mixture (air or air-fuel) into the cylinder (suction process), the compression of this mixture (compression process), the combustion of the compressed mixture, followed by power generation (expansion process), and the exhausting of the burned gases (exhaust process) (Figure 1). In internal combustion engines, these processes can take place in a single volume (for example, piston engines), or each process can take place in separate components (for example, gas turbines). There is also a 6-stroke engine concept that utilizes exhaust waste heat by performing two more processes after these processes [1-3].

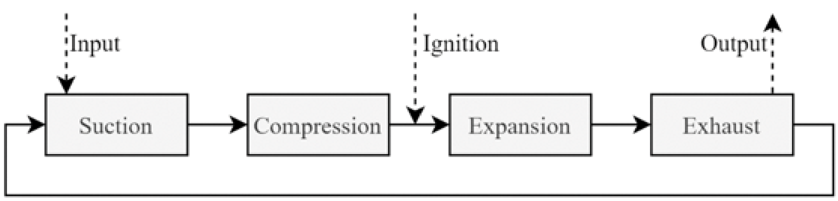

Figure 1. Processes occurring in internal combustion engine cycles

The process in Figure 1 is independent on fuel. While a controlled ignition occurs in gasoline-powered engines, self-ignition oin diesel-powered engines by

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NOMENCLATURE

$\dot{O}_f$	power from fuel
$\dot{O}_{in}$	input heat flow
$\dot{O}_{out}$	output heat flow
$\dot{m}_i$	mass flow of fluid i
P_e	effective power
P_i	indicated power
P_μ	friction loss power
m_i	mass of fluid i
p_{Tr}	transfer pressure
s_p	mean piston speed
θ_{E_g}	exhaust closing angle
BDC_e	effectie bottom dead center
BDC_g	geometric bottom dead center
h	stroke
B	cylinder radius
N	engine speed
r	crank radius
λ	connecting rod-crank ratio
μ	coefficient of friction
ε_e	effective compression ratio
ε_g	geometric compression ratio

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