INCORPORATION OF EXHAUST GAS RECIRCULATION AND SPLIT INJECTION FOR REDUCTION OF NOx AND SOOT EMISSIONS IN DIRECT INJECTION DIESEL ENGINES

by

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In this paper, reduced temperature combustion has been investigated at high load condition of a direct injection Diesel engine. A 3-D computational fluid dynamics model for flow field, spray, air-fuel mixture formation, combustion, and emissions formation processes have been used to carry out the computations. The combined effect of exhaust gas recirculation temperature and exhaust gas recirculation rate was analyzed to choose with consideration of engine performance. Then, the influence of different injection rates and split injection was explored at a reduced temperature combustion condition by the use of exhaust gas recirculation. The results represent sensitiveness of various injection schemes on the combustion process and emission formation at reduced temperature condition in direct injection Diesel engines.

Key words: *Diesel engine, Combustion, Emission, EGR, Split injection*

1. INTRODUCTION

Direct-injection diesel engines have proved to be an efficient option in heavy-duty applications like transportation or power generation. However, due to the natural conditions of high pressure and temperature in the combustion process, diesel engines emit considerable amounts of pollutants, especially nitrogen oxides (NOx) and soot [1]. International regulations ratified in recent years have imposed more stringent limits on pollutant emissions in internal combustion engines. To comply with these regulations with the common rail injection system which is widely used in recently developed engines, several new fuel injection strategies on conventional diesel combustion have been investigated in direct injection diesel engines.

Variable injection rates are a possible way to meet increasingly restrictive emissions' requirements for direct injection diesel engines. Jafarmadar et al. [2] investigated the effect of injection mode parameters on combustion and emissions of a DI diesel engine via Fire CFD code. The results indicated that the use of different injection rate curves affects the combustion related properties and