

عنوان مقاله:

Simulating Turbulence and Combustion in CNG Turbocharged Engine Considering Cylinder Thermal boundary layer and EGR

محل انتشار:

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نویسندگان:

Sh Kharazmi - *PhD student, Sharif University of Tech. /Mechanical Engineering Dept*

A Mozafari - *PhD student, Sharif University of Tech. /Mechanical Engineering Dept*

A Hajilouy-Benisi - *Associate Professor, Sharif University of Tech. /Mechanical Engineering Dept*

خلاصه مقاله:

With increase in operating vehicle population, strict emission regulations and fossil fuel source limitations, engine manufacturers are developing new engine technologies as well as considering alternative fuels. Engine specific fuel consumption should be reduced to have more economic vehicles and to pass emission regulations. Normal fuels like gasoline and diesel have very high demand, therefore they are more expensive. CNG as an alternative fuel not only has lower price but also is a cleaner fuel, producing lower emissions of carbon dioxide (CO₂), unburned hydrocarbons (HC) and carbon monoxide (CO). In this paper, a computer code is developed in MATLAB environment to simulate turbulence and combustion in a CNG turbocharged engine. Different turbulence parameters are calculated step by step during compression, inflammation and combustion processes. Turbulent flame speed is calculated with Gulder equation by using simultaneous turbulence parameters. Cylinder thermal boundary layer has been considered to improve simulation for flame termination. Simulation results are validated with corresponding available experimental data. Theoretical predicted results of pressure and mass fraction burned versus crank angle have very good agreement with the experimental results with a maximum deviation of 9.5% and 8.7% for mass fraction burned in sample states 1 and 2 respectively and 10% and 18% for cylinder pressure in states 1 and 2 respectively. CNG EGR effects as well as spark timing effects on combustion have been investigated

کلمات کلیدی:

CNG, combustion, flame speed, turbulence, engine simulation

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