عنوان مقاله:

Internal combustion engines in cylinder flow simulation improvement using nonlinear k-ε turbulence models

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نویسندگان:

a Mirmohammadi - *Department of Mechanical Engineering, Shahid Rajaee Teacher Training University, Lavizan, Tehran*

f Ommi - *Department of Mechanical Engineering, Tarbiat Modares University, Tehran*

خلاصه مقاله:

The purpose of this paper is to studying nonlinear k-ε turbulence models and its advantages in internal combustion engines, since the standard k-ε model is incapable of representing the anisotropy of turbulence intensities and fails toexpress the Reynolds stresses adequately in rotating flows. Therefore, this model is not only incapable of expressing the anisotropy of turbulence in an engine cylinder, but also is unable to provide good performance whencomputing the swirling and tumbling flows is important in engine cylinders. Thus, in this paper, the results of nonlinear k-ε model are compared with thoseof the linear one. Results of diesel engine simulation with linear and nonlineark-ε models in comparison show that turbulence intensity in the nonlinear model simulation is higher than that of the linear model; also, nonlinear k-ε modelspredict the second peak value because of the bowl shape in expansion stroke for turbulence intensity. Gas injection results show that nonlinear turbulence models predict spray penetration accurately because of correctly turbulenceintensities predicting. Also, the results demonstrate that, for high pressure gas injection, turbulence intensity is high and predicted accurately using nonlinearmodels. Then, its spray penetration length is predicted accurately in comparison to experimental data's. Although CPU time spending in the nonlinear .model is more than that of the linear one, the non-linear stress model is found to increase computation time by 19%

کلمات کلیدی:

Engine, Flow, Simulation, Nonlinear k-ε , Turbulence model