World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:12, No:02, 2018

Modeling and Simulating Drop Interactions in Spray Structure of High Torque Low Speed Diesel Engine

Authors : Rizwan Latif, Syed Adnan Qasim, Muzaffar Ali

Abstract : Fuel direct injection represents one of the key aspects in the development of the diesel engines, the idea of controlling the auto-ignition and the consequent combustion of a liquid spray injected in a reacting atmosphere during a time scale of few milliseconds has been a challenging task for the engine community and pushed forward to a massive research in this field. The quality of the air-fuel mixture defines the combustion efficiency, and therefore the engine efficiency. A droplet interaction in dense as well as thin portion of the spray receives equal importance as other parameters in spray structure. Usually, these are modeled along with breakup process and analyzed alike. In this paper, droplet interaction is modeled and simulated for high torque low speed scenario. Droplet interactions may further be subdivided into droplet collision and coalescence, spray wall impingement, droplets drag, etc. Droplet collisions may occur in almost all spray applications, but especially in diesel like conditions such as high pressure sprays as utilized in combustion engines. These collisions have a strong influence on the mean droplet size and its spatial distribution and can, therefore, affect sub-processes of spray combustion such as mass, momentum and energy transfer between gas and droplets. Similarly, for high-pressure injection systems spray wall impingement is an inherent sub-process of mixture formation. However, its influence on combustion is in-explicit.

Keywords : droplet collision, coalescence, low speed, diesel fuel
Conference Title : ICAMAME 2018 : International Conference on Aerospace, Mechanical, Automotive and Materials Engineering
Conference Location : London, United Kingdom
Conference Dates : February 15-16, 2018