

CFD modeling of large two-stroke marine engine using tabulated kinetics and simplified CFD approach

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Maritime transport plays an increasingly important role in cargo transportation and international trade. However, the growth of the shipping industry and business activities come at the cost of more gaseous and particle emissions. To further improve and optimize the combustion and emission characteristic in a marine diesel engine, detailed information of in-cylinder fuel-air mixing, combustion and emission formation processes is required.

To this end, the main objective of this work is to develop and consolidate the numerical models and setups for marine engine application using OpenFOAM and Lib-ICE. The presentation can be divided into two parts: 1. the tabulated flamelet progress variable (TFPV) combustion model will be first presented, together with its validation in a two-stroke marine engine at various operating conditions; 2. the development of the mesh-independent simplified spray model will then be discussed, as well as its validation in a spray combustion chamber under engine-realistic conditions.