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Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

Abstract:

Oral session preferred

CHARACTERIZATION OF FUEL SPRAY FOR A MARINE BURNER BACK-SPILL ATOMIZER

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Atomization is a key process in liquid fuel combustion: the droplet sizes and velocities are a determining factor in fuel penetration into the oxidizer, and therefore have a primary effect on the mixing conditions, flame shape and stability in combustion chambers. It is common practice to consider macroscopic parameters to design or choose an appropriate atomizer. It is however desirable to obtain a more detailed knowledge of the spray characteristics of specific atomizers. These data can be used to validate or as boundary conditions in CFD simulations, but also to evaluate the flexibility of an existing system regarding various fuel properties or operating conditions. The aim of this study is to obtain detailed data for droplet size and velocities produced by a back-spill hydraulic nozzle used in a marine auxiliary boiler. To do so, different regions of the spray produced in an atomizer test rig has been captured with an optical measuring system. The experiments reproduced the operating condition of the real boiler at partial and full load. Different test liquids have been used to observe the effect of varying viscosity and surface tension. Results include distribution of droplet size, position, velocity magnitude and direction for the various experiments. It is also shown that there is a strong dependence between these parameters, suggesting that lumping each in an independent distribution causes the loss of relevant information.