

Abstract Submitted
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PDF modeling of chemically reacting flows in a compression-ignition engine VIVEK RAJA RAJ MOHAN, DANIEL HAWORTH, Penn State University, JIAN LI, Volvo Group Trucks Technology — A transported probability density function (PDF) model is used to simulate the in-cylinder combustion processes in a compression-ignition heavy-duty engine. The flow inside the cylinder in a compression-ignition engine is chemically reacting and highly turbulent. Therefore, the turbulent fluctuations in composition and temperature will influence the mean reaction rates. These turbulence-chemistry interactions (TCI) play an important role in predicting the combustion processes accurately. Recent results from in-cylinder combustion simulations for a compression-ignition engine are compared with measured data for several operating conditions. The PDF model, which takes into account for TCI, predicts the combustion processes more accurately compared to a model which neglects TCI. Marked differences are observed in predicting the flame structure and the pressure and heat-release traces as well as in predicting the emission characteristics.

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