

# Past and Future Research Activities in Spray Simulations at TKK/ICEL

Ville Vuorinen

`ville.vuorinen@tkk.fi`

Internal Combustion Engine Laboratory, Helsinki University of Technology

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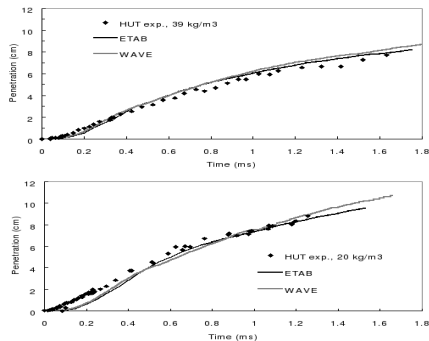


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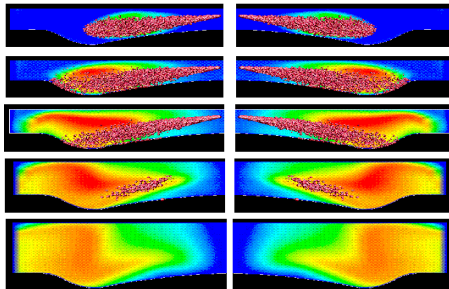
# Past Activities in Spray Simulations

## 2001-2005

- Study diesel fuel sprays and droplet breakup models using KIVA3Vrel2.
- Spray and combustion simulations using STAR-CD, various grids, model sensitivity studies etc.
- $k - \epsilon$ -models
- Momentum, velocity and mass coupling by Lagrange polynomials
- Spray parametrization successful
- For example, ETAB and WAVE models have been successfully applied to simulate the Wärtsila-20 and Wärtsila-46 engines



**Figure 1:** Matching of penetration curves for the Wartsila engine.



**Figure 2:** Example of vapor distribution for the Wartsila engine.

# Recent Spray Activities

## 2005-2006

- Lots of effort on understanding the steps it takes to move on to doing serious LES.
- Literature study on LES in Multiphase Flows
- Problem of near-nozzle modeling has been recognized especially in the case of LES. The problem has been assessed in collaboration with the colleagues at the Argonne National Laboratories (SAE2006-01-1390).



# Future Studies at ICEL/TKK

## 2006-

- Phd-project on realistic fuel spray simulations using LES, realistic modeling of the near-nozzle region. LES of fuel air mixing. Collaboration with KTH/Lund universities.
- Studies with KIVA3Vrel2, implementation of the subgrid scale-models, studies on combustion etc. Collaboration with MTU.
- New collaboration on computational and experimental spray modeling wellcome!

