Assessment of Combustion and Turbulence Models for the Simulation of Combustion Processes in a DI Diesel Engine

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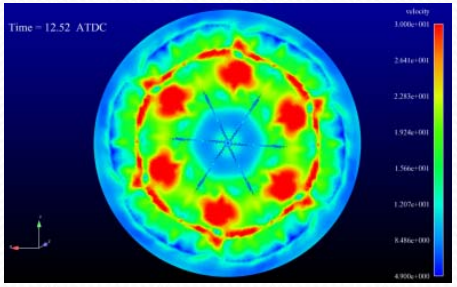
Objectives:

- To evaluate the predictive capability of various combustion and turbulence models
- To conduct numerical investigation on the effects of biodiesel fuels on combustion and emission characteristics in a DI diesel engine

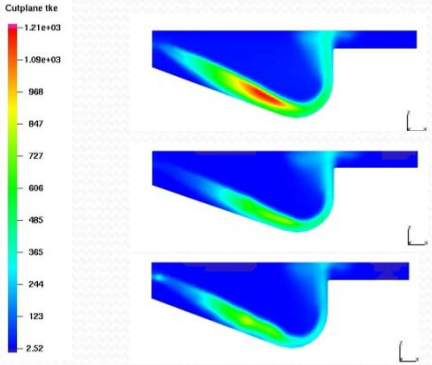
- Various applied combustion and turbulent models

	Ignition model	Combustion model	Turbulence model	Emissions models
Case 1	Shell auto-ignition model	Multiple-scale CTC model	Rapid distortion RNG κ- ε model	Hiroyasu soot model + Zeldovich NO_x model
Case 2		Single-scale CTC model	Rapid distortion RNG κ- ε model	
Case 3		Multiple-scale CTC model	RNG κ- ε model	
Case 4		Multiple-scale CTC model	κ- ε model	

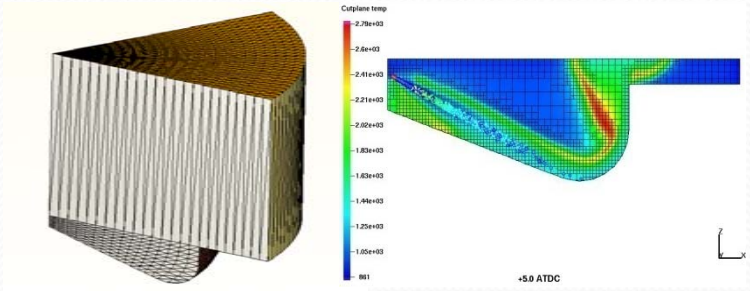
- Chemical Kinetic Mechanisms including 43 species and 160 reactions steps are used for the simulation of biodiesel fuled engine.



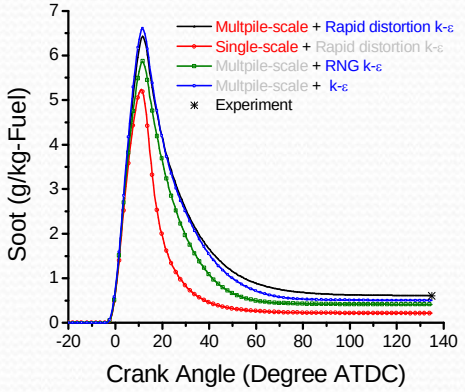
Overview of simulation on entire in-cylinder velocity profile



Predicted turbulent kinetic energy by different turbulence models at 5° ATDC



Computational domain and a representative result of in-cylinder combustion and emission



Predicted soot histories and comparison with measured result