

SUPPORTING INFORMATION

(Supplementary Materials)

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Figure S3. Simulated mole fraction profiles of H atom and CH_3 radical.

Table. S1. Physical models used in 3D-CFD simulations

| | |
|------------------------------|---------------------|
| Turbulent Dispersion | O'Rourke model |
| Drop Evaporation Model | Frossling model |
| Collision model | NTC collision model |
| Spray-wall interaction model | Wall film model |
| Critical value for splashing | 3330.0 |
| Fraction splashed | 1.0 |
| Rebound Weber number | 5.0 |
| Separation constant | 3.0 |
| Turbulence Model | RANS |
| Karmen's constant | 0.42 |
| Wall heat transfer model | O'Rourke and Amsden |

Table. S2. Engine physical parameters in 3D-CFD simulations

| | |
|------------------------|------------|
| Bore*Stroke | 105*125 mm |
| Crevice Volume | 1081.8 mL |
| Speed | 2500 r/min |
| Connecting Rod Length | 210 mm |
| Valve Number | 4 |
| Compression Ratio | 16:1 |
| Swirl Ratio | 1.6 |
| Chamber Volume | 61.6 mL |
| Total Injected Mass | 30 mg |
| Intake Air Pressure | 0.15 MPa |
| Intake Air Temperature | 300 K |

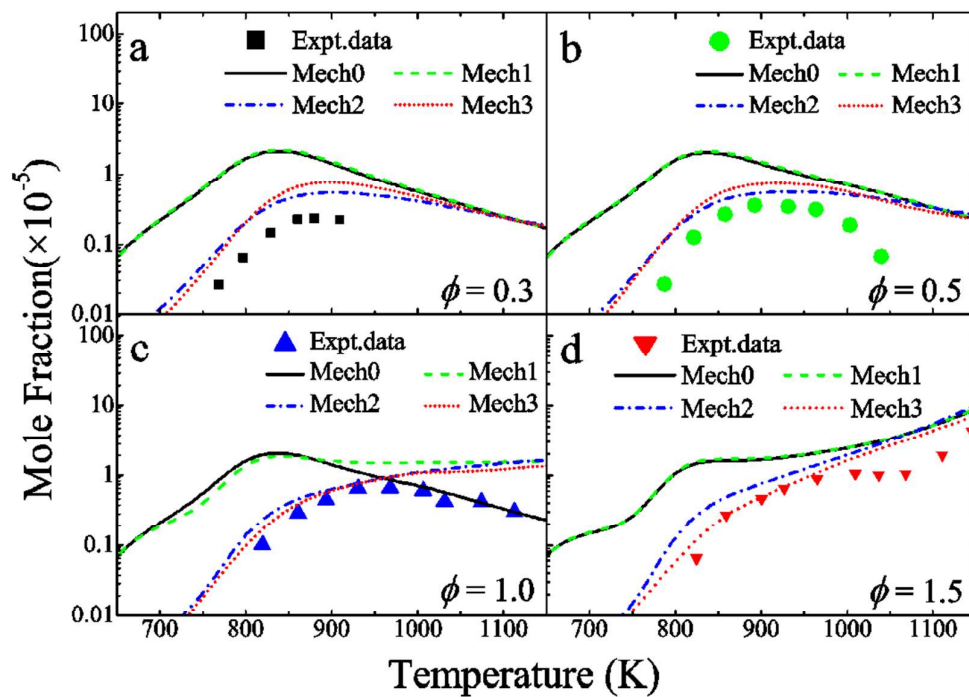


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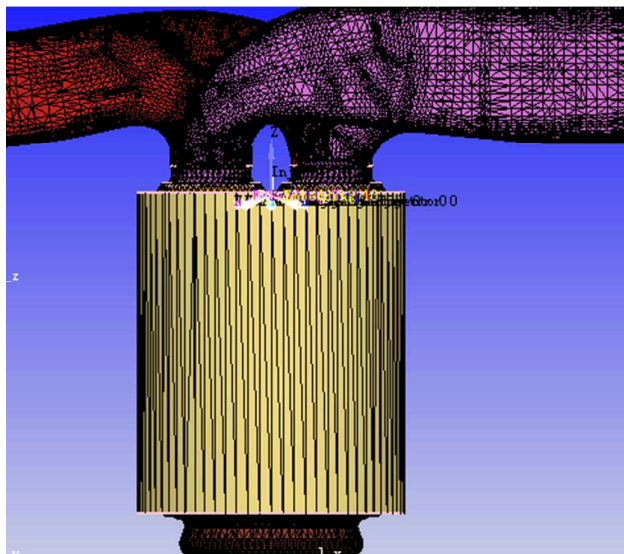


Figure S2. Computational grids with a cell number of around 100,000 for the 3-D CFD engine simulation, including an intake valve and an exhaust valve.

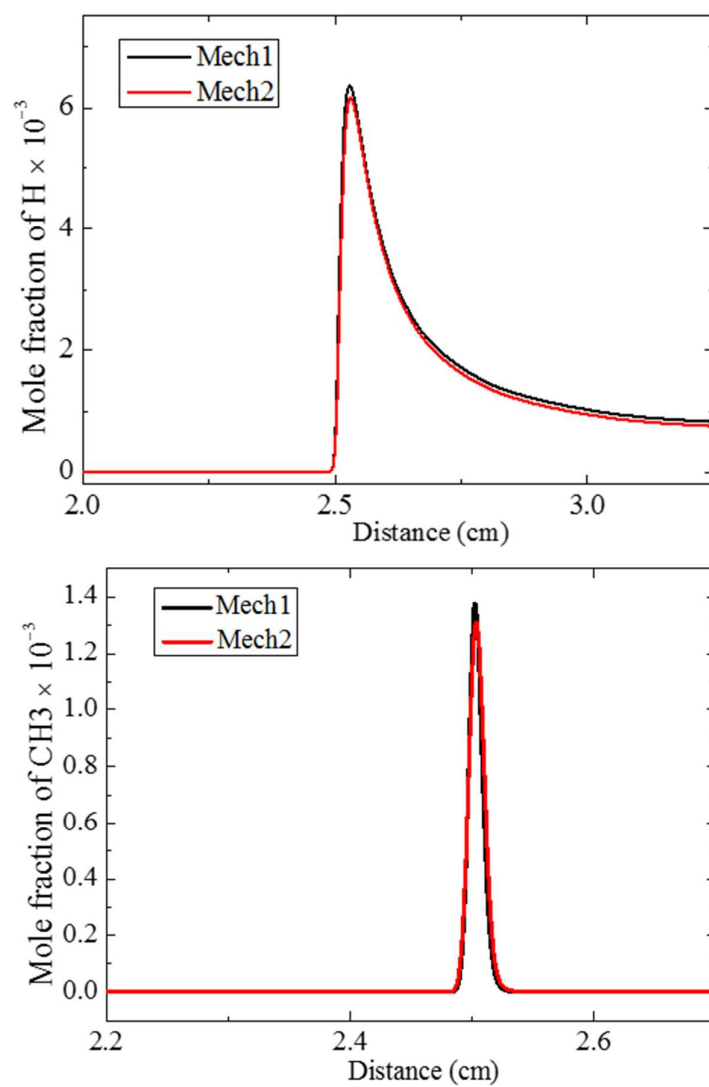


Figure S3. Simulated mole fraction profiles of H atom and CH_3 radical.