Optical sensor system for time-resolved quantification of methane concentrations: validation measurements in a rapid compression machine

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Highlights

- A refined data analysis procedure for a methane sensor system capable of measuring temperature and gas concentration simultaneously inside an internal combustion engine is presented.
- The measurement method is based on broadband infrared absorption an calculations using the HITRAN database.
- Validation experiments under well-defined conditions using a rapid compression machine to simulate environmental conditions inside an internal combustion engine are performed.
- The determination of temperature is compared to a commercially available system based on water absorption in the near infrared.
- Accuracy and precision of the methane sensor system in determination of air-fuel ratios are 4.6% and 1.3% respectively.