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EVALUATION OF THE VAPORIZATION ENERGY OF A FUEL SPRAY IN A RESEARCH ENGINE USING INFRARED IMAGING AND 1D MODEL

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ABSTRACT This paper deepens the study on fuel evaporation in a modern internal combustion engine equipped with high pressure injection system by modelling and optical diagnostics. A 1d model has been coupled to experimental results of infrared imaging measurements carried out in an optical diesel engine. Images of the in-cylinder processes have been recorded at different crank angle using a research compression ignition engine with optical access through the piston. A bandpass filter has been used to isolate the fuel vapor phase (3.4 μm) and to analyze the distribution and concentration of fuel in the combustion chamber. On the other hand, a 1d model of fuel injection has been implemented in order to calculate the instantaneous fuel vapor mass and the evaporation rate. The energy required for the vaporization of the fuel and its contribution to the calculated rate of heat release in the cylinder has been evaluated with the support of the infrared emission measurements.