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# Measurement of speed of sound, density compressibility and viscosity in liquid Methyl Laurate and Ethyl Laurate up to 200 MPa by using acoustic wave sensors

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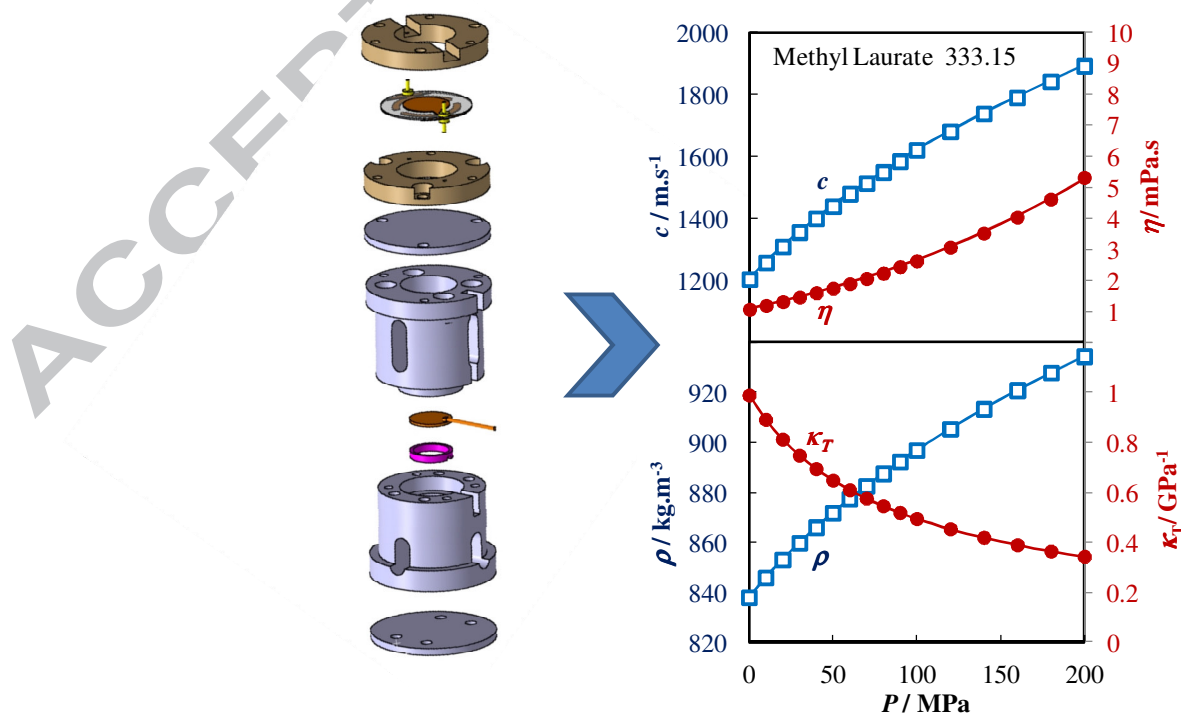
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## ABSTRACT

This paper presents measurements of speed of sound, density, viscosity and compressibility in liquid ethyl laurate and methyl laurate along isotherms ranging from (293.15 to 353.15) K at pressures that cover the pressure range of common rail direct fuel injection systems (up to 200 MPa). Measurements have been carried out by two different acoustic wave sensors assembled within a single device. The former works in the longitudinal mode to determine speed of sound whereas the latter acts in the thickness shear mode in order to measure the density viscosity product. The measurement principle of sound speed is based on pulse-echo technique whereas density is evaluated by integration of speed of sound measurement using Newton Laplace equation. Viscosity is determined from measurement of the resonance behavior of the thickness shear wave sensor. Finally both isothermal and isentropic compressibilities are obtained from density and speed of sound data.

## GRAPHICAL ABSTRACT



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