

# Assessment of elliptic flame front propagation characteristics of hydrogen in an optically accessible spark ignition engine

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The absence of carbon content of hydrogen fuel makes it an attractive candidates for future energy carriers. Hydrogen or dual fuelled engines are a practical alternative to pure hydrocarbon fuelling modes. However, fine tuning of current engines is necessary. In this study premixed hydrogen flame propagation is investigated in a single-cylinder, spark-ignited, four-stroke optically accessible spark ignition test engine using high-speed imaging. Ellipses were fitted on the flame contours during the analysis to obtain flame speeds and flame centre motion. The test conditions covered a range of engine speeds from 1000 rpm to 2000 rpm with 100 rpm increments using a lean mixture,  $\phi = 0.67$ . The fine temporal resolution allowed the time, at which spark governed kernel formation becomes a function of engine parameters to be determined. The few data that have been published in the literature regarding hydrogen flame speeds were compared with the finding of this study. © 2013, Hydrogen Energy Publications, LLC. Published by Elsevier Ltd. All rights reserved.

Ellipse

Flame speed

Hydrogen

Internal combustion

Optical engine

Spherical

Ellipse

Flame speed

Internal combustion

Optical engine

Spherical

Dual fuel engines

Electric sparks

Engine cylinders

Hydrogen