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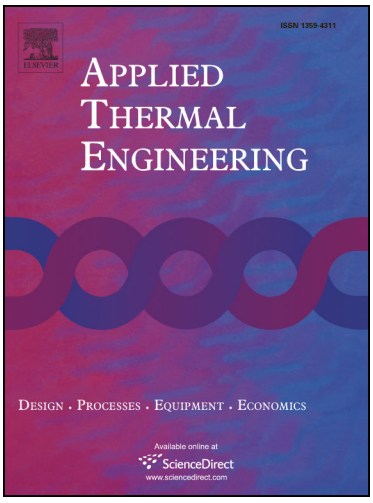

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Effect of wall surface temperature on ignition and combustion characteristics of diesel fuel spray impingement

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ABSTRACT: This paper investigated the ignition and combustion characteristic of wall-impinged diesel sprays in a constant volume combustion vessel simulated the diesel engine condition. A steel flat wall was installed perpendicular to the fuel injector axis. Wall surface temperatures were set at 45℃, 90℃, 150℃, 280℃, 380℃, 460℃, 510℃ and 570℃ separately, and a single nozzle hole with a diameter of 0.12mm was adopted. Direct image method was applied to capture the natural luminosity and liquid spray to analyze the ignition and initial combustion process. The results reveal that, with the decrease of the wall temperature, ignition delay time becomes longer and the ignition positions become farther away from the wall. The total flame luminosity reduced and more time has been spent to reach the saturation under low wall temperature. When the wall surface temperature decreased, both flame height and flame width reduced. And they decreased more sharply in the low temperature zone. There obviously exists the temperature gradient near the wall surface for the low temperature surface is in the high ambient temperature condition. The low temperature zone was negative to the ignition and initial combustion of the fuel mixture. For this reason, the initial ignition location transferred to the high temperature zone.

Keywords：diesel engine；impinging jet；wall surface temperature；ignition delay time；flame development

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