Application of high-pressure direct-injection methanol in compression ignition engines: From fuel preparation to engine test.

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Methanol is a potential carbon neutral fuel in future. Internal combustion engines are widely used and consume more than 60% oil in the world. Therefore, the develop of low-carbon or carbon neutral fuel is very important to reduce carbon emissions in future. Methanol has been used in spark igniton engines to some extent, while methanol is hard to be used in compressure ignition engines due to its awful auto-ignition property, low viscosity and thus the low reliability. Comapred with spark ignition engines, compression igntion engines have higher thermal efficiency and torque. Therefore, the applicaion of methanol in compression igniton engines has more advantages than spark ignition, but the usage also meet some challenges in compression ignition engines. In the current works, firstly, how to improve fuel properties of methanol to meet the needs of high-prssure common-rail direct-injeciton system were studied based on different fuel tests, incuding the increase of fuel viscosity, auto-ignition property, antiwear agent, corrosive, etc. Secondly, the application of methaonl in high-pressure direct-injection compression ignition engines was tested preliminarily on a heavy-duty six-cylinder engines, and the test focused on low-load in the current. Thirdly, how to keep the stable methanol combustion as using high-prssure common-rail direct-injeciton system was analyzed based on advanced optical diagnostics, and found that the temperature control in the key factor to keep stable auto-ignition and subsequent combustion. Fourthly, the The toxicity of methanol to typical cells was measured. Finally, it can be concluded that methanol has the potential to replace diesel fuel in compression ignition engines to reach carbon neutralization in the future development in engines.

Biography

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