

Numerical Investigation of Oxy-Fuel Combustion in Gasoline Engine for Carbon Capture and Storage

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Abstract : To implement carbon capture and storage (CCS) for eliminating carbon dioxide (CO₂) emissions, this paper describes a study on oxy-fuel combustion (OFC) with an ethanol-gasoline dual-fuel spark ignition (DFSI) engine under economical oxygen consumption at low and mid-high loads which was performed by 1D simulation. It is demonstrated that under OFC mode without other optimisation, brake mean effective pressure (BMEP) can meet the requirement at mid-high load, but it has a considerable decline at low load compared to conventional air combustion (CAC) mode. Moreover, there is a considerable deterioration in brake specific fuel consumption (BSFC) compared to that of CAC mode. A practical method is proposed to optimise the DFSI engine performance under OFC mode by changing intake charge components and utilising appropriate water injection (WI) strategies.

Keywords : oxy-fuel combustion, dual-fuel spark ignition engine, ethanol, gasoline, computer simulation

Conference Title : ICRED 2022 : International Conference on Renewable Energy and Development

Conference Location : Tokyo, Japan

Conference Dates : July 21-22, 2022