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Combustion of Biofuel as a Renewable Energy Source in Sandia Flame Geometry SEYED MOEIN RASSOULINEJAD-MOUSAVI, YIJIN MAO, YUWEN ZHANG, Department of Mechanical and Aerospace Engineering, University of Missouri, Columbia, Missouri, 65211, USA — Energy security and climate change are two important key causes of wide spread employment of biofuel notwithstanding of problems associated with its usage. In this research, combustion of biofuel as a renewable energy source was numerically investigated in the well-known and practical Sandia flame geometry. Combustion performance of the flame has been simulated by burning biodiesel (methyl decanoate, methyl 9-decenoate, and n-heptane) oxidation with 118 species reduced/skeletal mechanism. The open-source code OpenFoam was used for simulating turbulent biodiesel-air combustion in the cylindrical chamber using the standard k-epsilon model. To check the accuracy of numerical results, the system was initially validated with methane-air Sandia national laboratories flame D experimental results. Excellent agreements between numerical and experimental results were observed at different cross sections. After ignition, temperature distributions at different distances of axial and radial directions as well as species mass fraction were investigated. It is concluded that biofuel has the capability of implementation in the turbulent jet flame that is a step forward in promotion of sustainable energy technologies and applications.

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