# INVESTIGATION OF THE EFFECTS OF POROUS MEDIA AT THE EXIT OF COUNTER FLOW COMBUSTION USING THE LATTICE BOLTZMANN METHOD

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## ABSTRACT

Effects of porous media are investigated when it is installed at the exit of counter flow combustion and results are compared with the case without porous media. In this study Lattice Boltzmann Method (LBM) is utilized for simulation of flow, temperature and species concentration fields. One step global chemical reaction with Arrhenius reaction rate is used for simulation of propane/Air combustion. For investigation of porous media effects on concentration of CO species, two-step chemical kinetics is utilized for modeling methane/air combustion. Porous matrixes with different arrangements are created by scattering solid obstacle inside the flow path at the exit of the counter flow combustion and porous media with discrete particle is produced. A new model based on LBM is proposed for simulation of conduction heat transfer in discrete solid matrix. Results show that presence of the porous media decreases the maximum exit temperature and gives more uniform temperature profile at the exit. Also, utilizing porous media reduces the CO and unburned fuel concentration at the exit and consequently increases the combustion efficiency. Effects of the different porous structure on exit temperature and species concentrations are also investigated in this study.