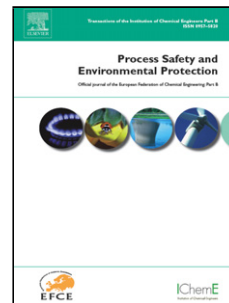


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Numerical study of the influence of particle reaction and radiative heat transfer on the flame velocity of gas/nanoparticles hybrid mixtures

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Highlights

- The influence of powder addition on methane/air flame propagation is studied
- The flame velocity is determined using a 1D model integrating radiation and reaction
- For 10 μm particles, radiative transfer has little influence on the flame velocity
- When adding 75 nm particles, the heat radiation promotes the flame propagation
- The reactive contribution of carbon black can be neglected with regard to radiation

Abstract

A one-dimensional model was developed to determine the flame velocity of a gas mixture explosion through a two-phase media containing nanoparticles. The mass and energy balances, which take into account a semi-global reaction mechanism with 10 reactions for methane and one carbon nanoparticles combustion, were solved by the finite volume method. The flame propagation model shows a good agreement with commercial software

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