Effects of Flow Stretch on Premixed-Flame Propagation in Closed Tube

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ABSTRACT

Here a hydrodynamic model was proposed for flame propagation in close tube effected by flow stretch. The flame is treated as a surface of discontinuity like in previous work. For the structure governing flame burning rate, large activation energy and large heat release assumptions are used in the model. It is well known that for laminar premixed flames with Lewis number smaller then one propagating in open space, the burning rate will increase when it is subjected to positive flow stretch and the reverse is true for negative flow stretch. And for flame with Lewis number bigger then one the trend is just the opposite. For flames propagating in open space the pressure is constant , while in present study the overall pressure is rising with the flame propagation . Present theoretical results suggest for flames propagating in closed tube the effect of flow stretch to the flame is the same as that in open space. That is for flame in closed tube positive flow stretch will increase the mass burning rate for flames with Lewis number smaller then one, and for flames with Lewis number bigger then one the mass burning rate will decrease. The trend will reverse for flames experiencing negative flow stretch.

Keywords : Premixed-Flame ; Lewis Number ; Flow Strteh

Table of Contents

REFERENCES