Implementation of a chemical reaction model for combustion mixtures

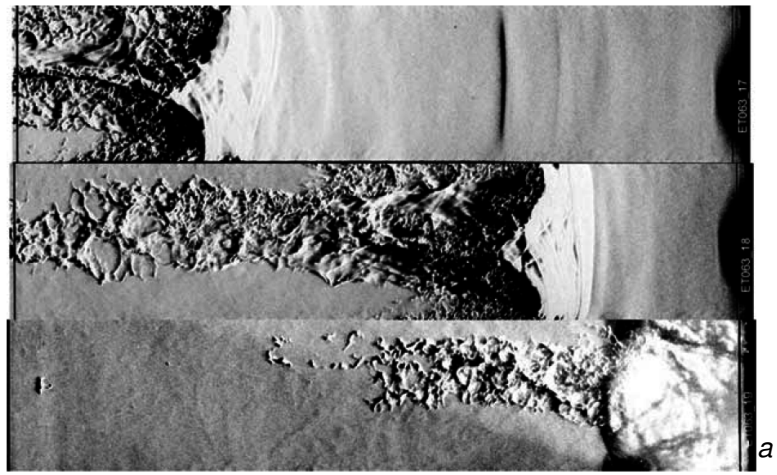
Bachelor- oder Studienarbeit

Description

Reactive flows cover an extensive range of physical phenomena, such as combustion, flames, detonations, stars and supernovae. The study of this kind of flows is of great importance in research and industry. The challenge in these highly dynamic and unsteady flows lies in handling the broad range of temporal and spatial scales of its strong coupled processes, therefore the use of chemical reaction models is mandatory.

Aim

The starting point is the elementary one-step chemical reaction model with constant heat capacities. This approach employs a global reaction mechanism where the internal energy and pressure are explicitly related. This results in a cheap computation. The main objective of this work is to extend the existing one-step model to a non-elementary one able to reproduce the characteristic chain reaction process in combustion and to catch the induction and reaction zones of the reactive front. A comparison of the two models in terms of results and computational time is of interest as well.



[a] Formation of a preheating zone and transition to detonation (Liberman2008)

Requirements

Enjoy programming, courses like CFD I or II and programming experience with `MatLab` are an advantage.

Contact

Sergio Bengoechea; Tel: 030-314 - 21131
bengoech(x)tnt.tu-berlin.de

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