TECHNISCHE UNIVERSITÄT DRESDEN

Institut für Strömungsmechanik, Professur für Strömungsmechanik

Vortrag

Large Eddy Simulation of turbulent combustion

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Turbulent combustion is a key phenomenon in many technical applications such as combustion chambers in gas turbines or IC engines. The physical processes involved are highly complex. Modelling turbulent reactive flows requires the knowledge of the turbulent characteristics as well as the chemical reactions - both typically occurring on different time scales. A fully resolved simulation (Direct Numerical Simulation) could provide all the required information of the smallest scales. However, excessive computational demand limits it to a research tool. In this context, Large Eddy Simulation (LES) has emerged as an important CFD tool in recent years. It resolves large scale motions of the flow field and contributes the small scale fluctuations by means of modelling. In the reactive case, the chemical kinetics need to be represented appropriately. Most combustion models are designed for a specific combustion regime, namely non-premixed or premixed combustion. In most technical flows however, mixed modes of combustion are present. A universal closure model to predict all modes of combustion is the stochastic field method, which is a Eulerian form of the transported probability density function (PDF) approach. The idea is to obtain all unresolved quantities from a solution of a time evolution of the PDF, which is represented by an equivalent set of stochastic differential equations. This talk will address general modelling issues in combusting flows and introduce the stochastic field method in LES context. Applications to partially premixed flames with extinction, a spark ignited lifted flame and a premixed swirl flame will be shown.

Termin: **Donnerstag, 25. November 2010, 14:50 Uhr**
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