Large Eddy Simulation of sprays: from single to multicomponent fuels

The correct treatment of the heat and transfer process in spray flows is necessary to allow the accurate prediction of the mixture composition and state at a specific region and at a specific time. To address such a demand, Large Eddy Simulation has been demonstrated as a feasible approach. In this talk, the main highlights of state-of-the-art models for droplet heat and mass transfer calculation are presented and connected with further modeling demands. For example, the consideration of the multicomponent characteristics of the gas phase for fuel and non-fuel droplets illustrates such a demand. Flames propagating in droplets mists are used to perform investigations about the multicomponent characteristics of the gas phase, where detailed description of the chemistry becomes feasible. According to the presented findings, evaporative cooling effects and flame surface wrinkling modeling are evaluated with LES. Altogether, the present results allow important conclusions to be made, which are straightly applicable to near-wall and general flows. Although not in the title, combustion is in the background of this talk.