Proposal for a Bachelor/Master Project

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13.10.2014

Large Eddy Simulation of a mixing flow field prior to a swirl burner

Modern gas turbine combustion chambers work under lean premixed conditions in order to account for more and more stricter environmental protection and the increasing demand of higher efficiency in regards of economical reasons. Unfortunately, lean premixed flames suffer under issues of stability which is inacceptable for airplane engines, as lives of people would be put in danger. Therefore, engine designs include non-premixed combustion in their construction. That ensures the required minimum safety of combustion endurance.

Keeping such applications in mind, the RSM at the TU Darmstadt has put a swirl burner under experimental investigation. This experimental setup unites a lean premixed swirl flow and an intruding pure fuel jet in a single combustion chamber. The EKT supports this effort with its know-how in Computational Fluid Dynamics and Numerical Combustion.

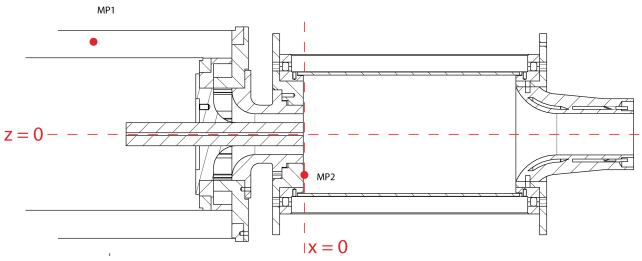

Figure 1: Experimental setup at RSM, J. Hermann

Student's task description

The geometry of the swirl body will be given. The first task will then be to create a mesh, such that Large Eddy Simulations can be conducted. The purpose of these simulations will be to find out the characteristic properties of the flow field prior to its entry into the tangential and radial channels of the swirl body. Having these flow field properties, the next task will be to develop boundary conditions, so that in consequence, this prior domain of the swirl body can be disposed from the simulation and finally time saved in later simulations of the configuration.