

Analysis of Vortical Structures Generated by the Swirler of Combustion Chamber

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Abstract : The most important part of modern lean low NOx combustors is a premixer where swirlers are often used for intensification of mixing processes and further formation of required flow pattern in combustor liner. Swirling flow leads to formation of complex eddy structures causing flow perturbations. It is able to cause combustion instability. Therefore, at design phase, it is necessary to pay great attention to aerodynamics of premixers. Analysis based on unsteady CFD modeling of swirling flow in production combustor swirler showed presence of large number of different eddy structures that can be conditionally divided into three types relative to its location of origin and a propagation path. Further, features of each eddy type were subsequently defined. Comparison of calculated and experimental pressure fluctuations spectrums verified correctness of computations.

Keywords : DES simulation, swirler, vortical structures, combustion chamber

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