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Computational flow field in energy efficient engine (EEE)[1] KENJI MIKI, JEFF MODER, MENG-SING LIOU, NASA Glenn Research Center — In this paper, preliminary results for the recently-updated Open National Combustor Code (Open NCC) as applied to the EEE are presented. The comparison between two different numerical schemes, the standard Jameson-Schmidt-Turkel (JST) scheme and the advection upstream splitting method (AUSM), is performed for the cold flow and the reacting flow calculations using the RANS. In the cold flow calculation, the AUSM scheme predicts a much stronger reverse flow in the central recirculation zone. In the reacting flow calculation, we test two cases: gaseous fuel injection and liquid spray injection. In the gaseous fuel injection case, the overall flame structures of the two schemes are similar to one another, in the sense that the flame is attached to the main nozzle, but is detached from the pilot nozzle. However, in the exit temperature profile, the AUSM scheme shows a more uniform profile than that of the JST scheme, which is close to the experimental data. In the liquid spray injection case, we expect different flame structures in this scenario. We will give a brief discussion on how two numerical schemes predict the flame structures inside the Eusing different ways to introduce the fuel injection.

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