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Light-round Simulations of an Annular Spray Combustor with Ambient Temperature Walls[1] KARL TOEPPERWIEN, RONAN VICQUELIN, EM2C/CNRS CentraleSupelec Universite Paris-Saclay — Numerical simulations of ignition in annular aeronautical combustors have progressed thanks to experimental data on the burner-to-burner flame propagation. This last phase of ignition is known as light-round. Large-Eddy simulations of the liquid-fueled annular combustor MICCA-spray featuring sixteen swirled injectors have followed the trends observed experimentally. Recent studies have proven that the wall temperatures strongly affect the light-round duration, which has not been satisfactorily retrieved in LES so far. Indeed, a priori studies suggest that variable thermodynamic properties of the boundary layer must be taken into account to improve the prediction of wall heat losses. Furthermore, the combustion model previously relied on the assumption of a constant flame wrinkling parameter. This appears to be inappropriate as shown by dedicated simulations in which the wrinkling parameter is computed dynamically. Both issues, which have only been studied separately before, are addressed in a light-round simulation of the MICCA-spray combustor using an Euler-Lagrange formalism for the liquid phase, a dynamic evaluation of the wrinkling parameter and a novel approach for wall modeling. The impact on the light-round duration is compared to available experimental data.

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Karl Toepperwien
EM2C/CNRS CentraleSupelec Universite Paris-Saclay

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