Madrid Summer Workshop Seminar

Turbulence-Flame Interactions in a Solid-Fuel Ramjet Combustor

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Solid-fuel ramjets (SFRJs) are one of the simplest propulsion systems for sustained, supersonic flight. SFRJs utilize the surrounding air in combination with a solid fuel to generate thrust. Despite its mechanical simplicity, the system's operation is governed by a highly interactive and complex set of physical processes. These include the gasification of solid fuel, vortex shedding from the fluctuating shear layer, near-wall heat transfer, and combustion within the turbulent boundary layer. Developing an understanding of this complex interlinking between flow and flame in such an unsteady scenario and accurately modelling it is highly relevant to the design of advanced SFRJs. In this presentation, we will discuss the key features of solid-fuel ramjet combustion and the associated modelling challenges for high-fidelity simulations. Additionally, a large eddy simulation (LES) framework that integrates reduced-order gas-phase chemical kinetics along with a semi-empirical model for the solid fuel regression rate using a standard solid fuel, hydroxyl-terminated polybutadiene (HTPB) will be presented.

Day: **25 June, Wednesday**
Time: *11:30 h.*
Place: *E.T.S. Ingenieros Aeronáuticos*
***Aula Magna**, Build. C. ground floor*