



## The First International Flow Dynamics Webinar

# Progress in Combustion Science and Application to Energy and Aerospace Propulsion

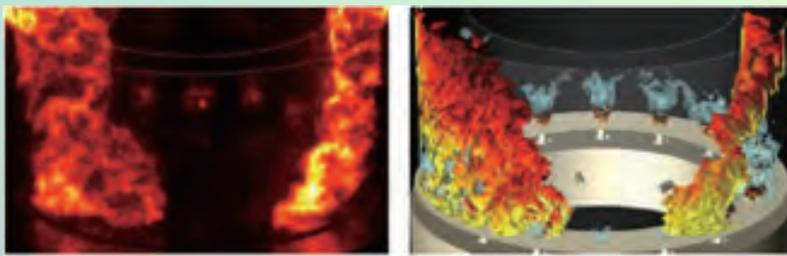
2020.

**09.Oct** FRI 15:00-16:20 (JST / UTC+0900)

Fee: Free of charge / Venue: Online via Zoom / Language: English

Registration required : [https://zoom.us/webinar/register/WN\\_yzKhUD-QRNCsI08QLyIsNg](https://zoom.us/webinar/register/WN_yzKhUD-QRNCsI08QLyIsNg)

Intended for a general audience, this seminar will include a synthesis on fundamental issues in combustion and applications to energy and propulsion. Advances in the field of combustion have been made by combining theory, simulation and experimentation. [\[Read more\]](#)



## Prof. Sébastien Candel

University professor emeritus at CentraleSupélec, University Paris-Saclay, honorary member of the Institut Universitaire de France.

Former president of the Académie des sciences, France.

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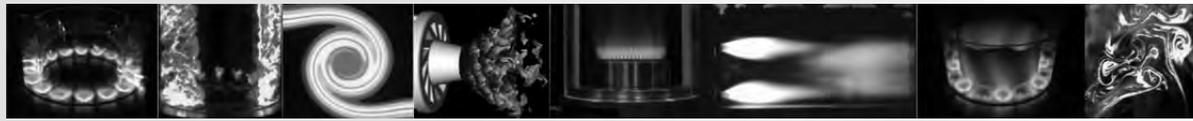


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Organized by Institute of Fluid Science, TOHOKU UNIVERSITY





## The First International Flow Dynamics Webinar

# Progress in Combustion Science and Application to Energy and Aerospace Propulsion

### **[Abstract]**

Intended for a general audience, this seminar will include a synthesis on fundamental issues in combustion and applications to energy and propulsion. Advances in the field of combustion have been made by combining theory, simulation and experimentation. This has been achieved by exploring new concepts and exploiting the novel possibilities of optical diagnostics using lasers and numerical imaging and by developing large scale simulations based on high performance computing. This will be illustrated by examples of current research on the dynamics of annular combustors, a geometry that is typically found in aero-engines and gas turbines. Further complexities have been tackled like those offered by the transcritical processes which control the combustion dynamics in many spacecraft engines operating with cryogenic propellants. Detailed experiments have brought considerable new insights on the basic processes guiding the development of large eddy simulations accounting for real gas effects and allowing the description of these flows.

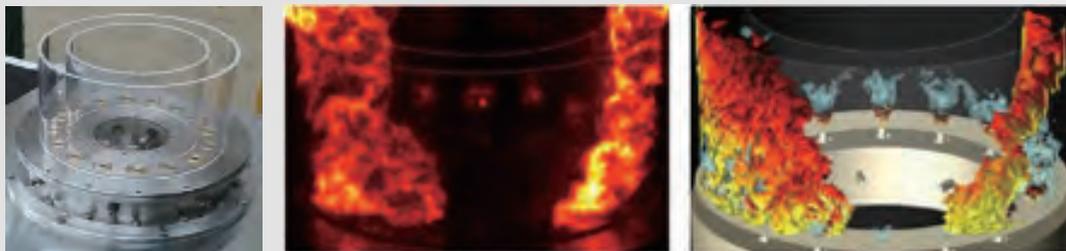


Figure 1. Light round Ignition of an annular combustor. Left: the MICCA test bench, an annular chamber with transparent walls giving optical access to the combustion zone. This system has 16 swirled injectors. In the center: instantaneous image of the light emission from the flame during ignition, Right: image obtained by simulation for the same instant (M. Philip, M. Boileau, R. Vicquelin, T. Schmitt, D. Durox, J.F. Bourgouin, S. Candel (2015) *J. Eng. Gas Turbines Power* (ASME) 137(3), 031501. Simulation of the ignition process in an annular multiple-injector combustor and comparison with experiments.)

### **[Biography]**

Sébastien Candel is a university professor emeritus at CentraleSupélec, University Paris-Saclay, honorary member of the Institut Universitaire de France. He is the past President of the Académie des sciences, France. He holds an Engineering degree from the École Centrale Paris, a PhD from the California Institute of Technology, and is a Doctor of Science of the University of Paris 6. Specialist of aeronautical and space sciences, he devoted his research to problems of combustion and aeroacoustics with propulsion and energy applications. His work, mainly carried out at the CNRS EM2C laboratory has concerned turbulent combustion modeling, combustion dynamics and instabilities, cryogenic combustion and high performance simulation. Sébastien Candel is currently president of the Scientific Council of the French utility company EDF. Among other distinctions, he received the CNRS Silver Medal and the Combustion Institute Silver and Gold Medals. A member of the Academy of Technology and of the Air and Space Academy, he is also a foreign member of the US National Academy of Engineering and of the Chinese Academy of Engineering.