The Symposium on Thermoacoustics in Combustion (SoTiC 2021) took place virtually from September 6-10, 2021. The organization of this year’s symposium was a collaboration of Mirko Bothien and Luca Magri, at that time Fellows of the Institute for Advanced Studies, with the Thermodynamics Institute, supported by a Scientific and an Organizing Committee and with contributions from the EU Training Networks MAGISTER and ANNULiGhT. A total of 170 participants attended the symposium, with 64 papers presented, making SoTiC 2021 one of the largest – if not, the largest – event with respect to combustion dynamics so far.

Based on all contributions and the corresponding presentations the members of the Scientific Committee selected the 20 best articles to be published in this Special Issue.

The symposium attracted interest from the technical and scientific community working in the field of combustion instabilities. Attendees enjoyed a week of interesting presentations on current research in the field of combustion instabilities in gas turbines and rocket engines that was inspiring and useful for the future research and development work of the participants. Since almost all presentations were held live and the opportunity for networking in the virtual “coffee” room with its discussion rooms was actively used, there was a very open and communicative atmosphere throughout the entire week, which at times made attendees forget the virtual format.

I’d like to give a special thanks to all authors who contributed papers to the symposium, as well as the five invited speakers who provided specific views and experiences on combustion instabilities: Bruno Schuermans, ETH Zurich, Switzerland; Aimée Morgans, Imperial College London, United Kingdom; Marco Zedda, Rolls-Royce plc, United Kingdom; Thierry Poinset, CNRS, Université de Toulouse, France; Jonas Moeck, Norwegian University of Science and Technology, Norway. I’d also like to thank all reviewers of this Special Issue for their expertise and time spent guaranteeing high quality contributions.

Mirko Bothien

Welcome to this Special issue of International Journal of Spray and Combustion Dynamics.

This issue collects selected contributions from the Symposium on Thermoacoustics in Combustion: Industry meets Academia (SoTiC) 2021.

It has been a pleasure to see that COVID-19 did not make a dent in our community’s high-quality scientific output. In fact, we received a large number of submissions both from industry and academia, which has made SoTiC 2021 a fine-tuned balance between advances in engineering practice and scientific discovery.

The Symposium has been heterogenous because it contained contributions from the key elements of the state-of-the-art in thermoacoustics and combustion instability: experiments, theory, and numerical simulations. To this, we added a dimension in data-driven methods, such as machine learning and data assimilation, which were only recently introduced in thermoacoustics, also thanks to the generous support from the Institute of Advanced Study (IAS), Hans Fischer Fellowship and Focus Group “Data-driven Dynamical Analysis in Fluid Mechanics”. Despite the rich heterogeneity, we strived to arrange a congenial schedule to foster the networking and exchanging of ideas; with the hope that these discussions sparked off new research collaborations. We hope you have enjoyed the Symposium and will enjoy this special issue of the International Journal of Spray and Combustion Dynamics.

Last, but not least, I would like to thank our invited speakers and authors for their contributions, without which the Symposium and this Special Issue could not exist. Special thanks go to our post-docs, doctoral students, and IAS staff who worked relentlessly (and behind the scenes) in the organization (and re-organization) of the Symposium.

Luca Magri