

EUROMECH Colloquium 571

“Jet noise modelling and control”

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Chairperson: Lutz Lesshafft

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Recent progress in jet-noise research has seen hydrodynamic stability theory occupy an increasingly central place. This is largely due to developments in modern numerical and experimental tools, and a closer association of these has clarified the extent to which linear theory can describe wavepackets in turbulent jets. EUROMECH Colloquium 571 succeeded in presenting a broad and rather complete overview of the state of the art, both from physical and technical viewpoints. Over the course of three days, a certain consensus became apparent regarding the appropriate theoretical framework for jet noise.

40 researchers participated in the colloquium, among them 18 PhD students, and a large number of leading experts in the field were present. Participants came from institutions in five different countries of the European Union (Belgium, France, Germany, Italy and The UK) as well as a number from Brazil, Russia and the USA. There were 32 oral presentations in total, spread out over the three days of the colloquium, plus three lively open-discussion sessions of about one hour each. The keynote lecture was given by Ulf Michel (CFD Berlin). All regular presentations were 20 minutes long.

EUROMECH Colloquium 571 was preceded by a two-day lecture series on “Measurement, simulation and control of subsonic and supersonic jet noise”, organised by the Von Karman Institute. This event was held at a venue in the neighborhood of the Ecole Polytechnique campus.

The majority of the work presented involved association of data from either high-fidelity numerical simulation or experiments (or both) with kinematic or dynamic modelling approaches, the former being based on the acoustic analogy. With respect to the latter, traditional “local” stability analysis featured in a number of studies, where its capacity to provide physical insight regarding trends observed in data or “global” analyses was borne out. “Global” stability studies were almost exclusively performed in the resolvent (alternatively input-output or frequency response) framework, and this emerged as one of the focal points of Colloquium 571.

There was a consensus that the role of turbulence in wavepacket modelling goes beyond its role in producing the mean flow, and a recognition that it activates many acoustically important wavepacket traits via the non-normality of the linear operator. A small number of contributions from the colloquium will be selected for publication in a special issue of the “Comptes Rendus de l’Academie des Sciences” (C. R. Mecanique).

The feedback from participants was extremely positive. Despite a dense scientific programme, social interaction took place during coffee breaks, a dinner banquet and a cocktail reception. Financial support was provided by Euromech, IUTAM, Ercoftac, E-CAero2, LaSIPS and Ecole Polytechnique.