

## History of Poitiers

Nick-named the 'town of a hundred bells', Poitiers is steeped in history, as one can see from the many impressions which have been left, from antiquity right up to the present day. In addition to its houses from "les années folles", and the new auditorium, Poitiers is also home to some of the oldest monuments of the Occidental Christian world: Saint John's baptistery, for example, dates from the 4<sup>th</sup> century.

A Celtic town, known as 'Lemonum', existed prior to the arrival of Julius Caesar. Lemonum then became known as 'Pictavia', which was the capital of the province Aquitaine in the 2<sup>nd</sup> century.



There exist today the remains of a Roman arena, which could hold up to 30,000 spectators; Roman city walls; thermal baths; temples dedicated to the Roman God Mercury... While there are many hotels dating from Renaissance times, the physiognomy of Poitiers is mostly marked by the Middle Ages, thanks to a number of rather colourful, famous and infamous characters: Clovis the Franc King, who defeated the Wisigoth barbarians in 507 AD; Charles Martel, who defeated the Arabs in 732; Saint Radegonde, who founded the first female monastery, the Saint-Croix Abbey, in 555; and, Eleanor of Aquitaine, great mécène and mother of Richard the Lionheart who, by her marriage to the King Plantagenêt, reigned over a kingdom which stretched from Aquitaine to England, and included present-day Normandy! The history of Poitiers has also been marked by many wars: the Norman invasions (9<sup>th</sup> century), the hundred years war (1336-1453) and later Religious wars (Calvin was in hiding for a time in Poitiers), and the French Revolution. However, despite these upheavals, many architectural and cultural marvels have survived to this day, such as the Counts' Palace of Poitou where Joan of Arc was interrogated regarding the motives of her mission, or the church Notre-Dame-la-Grande whose Romanesque facade (which dates from the 12<sup>th</sup> century) is a UNESCO world heritage site. Founded in 1431 by Pope Eugène IV, the University of Poitiers was host to a number of famous students: the poets Joachim du Bellay and Pierre de Ronsard, Francis Bacon, François Rabelais and indeed René Descartes.

### The Legend of the Grand' Goule

In the Poitiers underground there lived a winged dragon named the Grand' Goule, whose elongated, scaled body, was equipped with a scorpion's tail and clawed feet. The dragon used to devour the Nuns of the Sainte-Croix abbey when they went into the underground storerooms in search of provisions. Radegonde, the patron saint of the Poitevins, went to hunt the monster, equipped with a relic of the real crucifix—a gift from the byzantine emperor. Seeing the relic, the Grand' Goule was terrified, and on being showered with holy bread, the monster was destroyed. As a souvenir of this victory over the diabolical creature, for many centuries bread and cakes were thrown over an effigy of the Grand' Goule, which was paraded through the town during religious processions.

Historical text and photo by Nathalie Gaillard



## ERCOFTAC Symposium on Sound Source Mechanisms in Turbulent Shear-Flow Poitiers - France July 07-09 2008

### SPONSORS

AIRBUS  
CEAT (Centre d'Etudes Aérodynamiques et Thermiques)  
CNRS (Centre National de la Recherche Scientifique)  
ENSMA (Ecole Nationale Supérieure de Mécanique et d'Aérotechnique)  
ESIP (Ecole Supérieure d'Ingénieurs de Poitiers)  
LEA (Laboratoire d'Etudes Aérodynamiques)

### Symposium objectives

The question regarding the mechanisms by which heated turbulent flows convert vortical and thermal energy into acoustic energy remains as controversial as ever, despite over 50 years of intense research in the field. The first golden age of aeroacoustics (1950s-1970s), where the analysis approach was largely theoretical, led to an impasse in terms of an unambiguous identification of causality (between vortical, thermal and acoustic motions) in the flow equations, and indeed a general unified theory of aeroacoustics was not achieved—this impasse is of course inextricably tied to the theoretical problems faced in the field of compressible turbulence. Many of the most sophisticated theoretical developments were difficult to assess, due to the complexity of the physical quantities identified as relevant to the jet noise problem. As a result, many of the ideas and theories which currently exist regarding noise sources in jets remain contentious, and, rather than serving as a guide for low-noise design, tend instead to generate controversy and discord.

Recent developments in terms of our capacity to both numerically and experimentally analyse the physics of compressible, turbulent flows have opened up new possibilities however. The objective of this workshop is to provide a platform for open discussion of these possibilities. The workshop will comprise invited talks, held over a two-day period, wherein recent studies, findings and ideas can be presented. Extended round-table sessions will provide an opportunity for the community to think collectively, with a view to arriving at some consensus regarding priority future research goals, and the analysis tools which these will necessitate.

Registration fee: 200 Euro

Registration deadline: 31<sup>st</sup> May 2008

ONLINE REGISTRATION: <http://ercoftac-ssmstsf.ceat.univ-poitiers.fr>

#### Organising committee

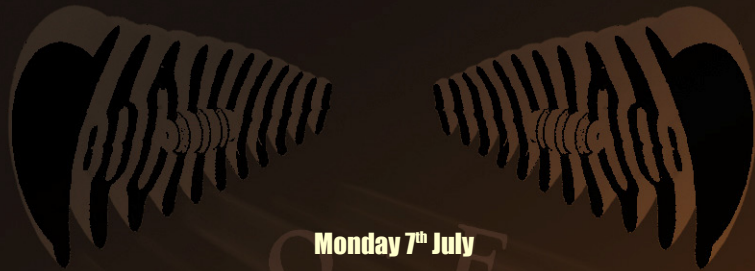
P. Jordan (Chairman)  
S. Lele (Co-chairman)  
V. Kopiev  
K. Viswanathan

#### Local committee

Y. Gervais  
V. Fortuné  
J.P. Bonnet  
J. Delville

#### Advisory Committee

T. Colonius  
A. Dowling  
J. Freund  
S. Glegg  
M. Goldstein  
M. Hirschberg  
M. Howe  
D. Juvé  
U. Michel  
C. Morfey  
L. Morino  
P. Morris  
N. Sandham  
C. Tam



Monday 7<sup>th</sup> July

19h30 Registration & Reception

## Scientific Program

Tuesday 8<sup>th</sup> July

### SESSION I

#### Existing jet noise theories

- 8h30 M. Goldstein – NASA Glenn research center, OH, USA.  
*The role of acoustic analogies in source mechanism identification*
- 9h00 B. Tester – ISVR, Univ. Southampton, UK;  
*Understanding and predicting forced mixer noise*
- 9h30 U. Michel – DLR, Inst. of Propulsion Technology, Berlin, Germany  
*Michalke's formulation of the acoustic analogy*
- 10h00 W.K. George, M. Wänström – Chalmers, Göteborg, Sweden;  
P. Jordan – LEA, Univ. Poitiers, France  
*Searching for source mechanisms in the flow equations*

10h30-11h00 Coffee break

### SESSION II

#### Source mechanism identification I: confronting experiments, models and theory

- 11h00 S. Lele – Stanford University, CA, USA.  
*Linear and nonlinear processes in sound radiation from shear layers and jets*
- 11h30 K. Viswanathan – The Boeing Company, Seattle, USA  
*Acoustic analogies and experimental evidence*
- 12h00 M. Harper-Bourne – QinetiQ, Farnborough, UK  
*Experimental source identification*

12h30-14h00 Lunch

### SESSION II contd.

#### Source mechanism identification I: confronting experiments, models and theory

- 14h00 C. Tam – Florida State Univ. Fl. USA  
*Recent progress in identifying the sources of jet noise*
- 4h30 P. Morris – Penn State, PA, USA  
*Source modelling and prediction methodologies*
- 15h00 V.F. Koptev S.A. Chernyshev, M. Yu Zaitsev – TsAGI, Moscow.  
*Vortex ring as a sound source: theoretical prediction and experimental evidence*

### PANEL / OPEN DISCUSSION I

15h45-18h30 Acoustic analogies: Can they be predictive?  
Do data support them?

19h30 Banquet – Château d'Avanton

## Program

Wednesday 9<sup>th</sup> July

### SESSION III

#### Source mechanisms identification II: experimental analysis techniques

- 8h30 J. Seiner – Univ. Mississippi, USA  
*Shock noise and its reduction on full-scale engines*
- 9h00 A. Guillon, P. Jordan, J. Delville – LEA, Poitiers, France.  
*Source-mechanism signatures in the nearfield*
- 9h30 T. Colonius & K. Gudmundsson – Caltech, CA, USA.  
*Instability waves, microphone arrays and jet noise*

10h00-10h15 Coffee Break

### SESSION III contd.

#### Source mechanisms identification II: experimental analysis techniques

- 10h15 S.A. Chernyshev & V.F. Koptev – TsAGI, Moscow.  
*On the relevance of viscosity effects in instability wave mechanisms*
- 10h45 R. Camussi, G. Caputi Gennaro – Università di Roma Tre, Dipartimento di Ingegneria Meccanica ed Industriale  
*Noise source identification through wavelet analysis of pressure/velocity data*
- 11h15 D. Papamoschou – Univ. California, CA, USA.  
*Noise sources in dual stream jets*

11h45-13h00 Lunch

### SESSION IV

#### Source mechanism identification III: numerical analysis techniques

- 13h00 JB Freund & R Kleinman – Univ. Illinois at Urbana Champaign, USA  
*The roles of large and small scale: some evidence from DNS*
- 13h30 N. Sandham – Univ. Southampton, UK.  
*Nonlinear interaction model of subsonic jet noise*
- 14h00 B.R. Noack, M. Schlegel & M. Luchtenburg – Berlin Institute of Technology  
*Reduced-order modelling for jet noise control*
- 14h30 C. Bogey, F. Coiffet, C. Bailly & D. Juvé – ECL, Lyon, France.  
*Identification of sound generation from LES data using flow-noise correlations*

15h00-15h30 Coffee Break

### SESSION IV contd.

#### Source mechanism identification III: numerical analysis techniques

- 15h30 V. Fortuné & M. Cabana – LEA, CNRS, Univ. Poitiers, ENSMA, France  
*DNS of anisothermal shear layers*
- 16h00 A. Agarwal, G. Gabard & S. Sinayoko – ISVR, University of Southampton, U.K.  
*On separating propagating and non-propagating dynamics in fluid-flow equations*
- 16h30 D. Bodony – University of Illinois at Urbana-Champaign  
*The effects of heating on the sources of high-speed jet-noise*

### PANEL / OPEN DISCUSSION II

17h15-19h15 How can we use the full space-time data  
from numerical simulation for noise-source identification?  
How can this guide experiments ?