

As a satellite event to MAVEBA 2015 in Florence, Italy,
a one-day summer school on

Physics-based Voice Simulation Techniques

Saturday 5 September 2015

Recommended prior attendance:

PEVOC workshops on replicas, simulation and Round Table on physic-based voice simulation

With recent advances in computing machinery and computing techniques, what are the prospects of simulating human voice production at the level of the underlying physics? How can simulations be tied to experiments with specimens or mechanical replicas? The focus will be on principles and techniques at the forefront of research. The day is comprised of six 45-minute sessions taught by leading researchers in the field, and one hour of group study session.

This summer school takes place in Florence close to the MAVEBA venue, at 09.00-17.00 on Saturday the 5th of September. The school will be **free of charge**. The number of seats will be limited to 25. If you wish to attend, please **submit a brief CV and a short statement of motivation** as to why you want to attend. Participants must cover their own travel and accommodation. The deadline for application is **19th June 2015**. Attendees will receive a list of recommended literature and research article reprints.

The summer school is hosted by the EU project EUNISON, www.eunison.eu, where more details and the application form are available. Questions may be addressed to Francesc Alias Pujol, falias@salleurl.edu.

Overview tutorials

Aimed at PhD students studying voice modelling, and as continuing education of interested researchers.

Tutorials (45 minutes each)

1. 09:15-10:00 FEM modeling of voice production (*Oriol Guasch and Sten Ternström*)
 - Boundaries of the voice organ: where should the computational domain end?
 - Strategies: split domains, or unified?
 - Challenges: fluid-structure interaction, contact, turbulence, aeroacoustics, moving boundaries, infinite domains
2. 10:00-10:45 Reality check (*Xavier Pelorson, Annemie van Hirtum, Stefan Becker*)
 - The need for physical replicas
 - Working with excised specimens
 - Imaging techniques relevant to FEM
3. 11:15-12:00 Aerodynamics (*Joan Baiges, Johan Jansson*)
 - From flow to sound (acoustic analogies and fully compressible simulations)
 - Modelling of fricatives
 - Fluid-structure interaction
 - Generation of the glottal pulse

4. 12:00-12.45 Acoustical modelling of wave propagation (*Oriol Guasch*)
 - 1d, 2d and 3d modelling
 - Radiation: what to do with the infinite field
 - Modelling of vowels
 - Wave propagation in moving vocal tracts
 - Modelling of diphthongs

(continued)

5. 14.15-15:00 Biomechanical modelling of the voice organ (*Olov Engwall and Örjan Ekeberg*)
 - The vocal tract is not an object
 - The glottis is not an object
 - How deep the skin? Tissue properties
 - Controlling the oral and laryngeal structures
 - Data from humans – what have we got?
6. 15:00-15.45 Orders of magnitude, and feasibility (*Johan Jansson and Sten Ternström*)
 - Coupling the slow and the fast domains
 - Parallel computing and voice problems
 - Cheating: Hybrid models
 - Dissemination: Providing wide access

7. 16:00-17:00 Group study session

Interfacing users to the simulations, application scenarios:

For example: phonetics, phoniatics, logopedics, voice pedagogy, language teaching

8. 17:00-17.15 Summary and adjourn