

# Julien B E N S A

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Laboratoire d'Acoustique Musicale  
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## Education

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*1999-2003* **Ph.D., University of Provence, Marseille, France**

Dissertation title : *Analysis and synthesis of piano sounds using physical and signal models.*  
Awarded May 23th, 2003, with honours (Mention Très Honorable). Reviewers: Pr. Julius O. Smith III and Pr. Antoine Chaigne.

*1998-1999* **Graduate Degree (DEA) in Acoustics and Signal Processing applied to Music.**

Université Paris 6 and IRCAM (Institut de Recherche et Coordination Acoustique Musique).

*1995-1998* **Electro-Mechanic engineer**

Ecole Spéciale des Travaux Publics, Paris.

## Research Activities

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*Sept. 2003-04* **Laboratoire d'Acoustique Musicale (Paris)**

**Postdoc CNRS**

Works on the perceived sound quality of musical instruments: modeling and cognitive evaluation.

*2001-02* **CCRMA, Stanford University (USA)**

**Visiting researcher**

Comparison between Finite Differences and Digital Waveguide synthesis methods.

*1999-2003* **Université de Provence (Marseille)**

**Ph.D.**

Dissertation title: Analysis and synthesis of piano sounds using physical and signal models. Available on line with sound examples at <http://www.lma.cnrs-mrs.fr/~bensa>. Supervisor: R. Kronland-Martinet (Laboratoire de Mécanique et d'Acoustique).

*1998 (4 months)* **Laboratoire de Mécanique et d'Acoustique (Marseille)**

**MA thesis**

Measurement and modeling of coupling phenomena on piano strings.

## Teaching Experience

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*2002-2004* **Specialized courses** at graduate level

Sound synthesis of musical instruments, acoustics, psychoacoustics, speech synthesis.  
Ecole Supérieure d'Ingénieur en Informatique et Génie des Télécommunications,  
Fontainebleau, France.

*2000-2003* **Joint supervision of three MA theses**

DEA d'Acoustique (Marseille).

## Guest lecturing

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**ASA meeting** (Acoustical Society of America, San Diego). “Stiff piano string modeling: Computational comparison between finite differences and digital waveguide” and “Piano sound synthesis: Relating physical phenomena to sound quality” (November04)

**Laboratoire de Mécanique et d’Acoustique** (Marseille). Seminar. “Qualité sonore: description cognitive et paramètres physiques” (May04)

**SARC opening** (Queen’s University, Belfast). Physical modelling day. “Synthesis of piano sounds using physical and signal models” (April04)

## Other Scientific Activities

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**Organisation** of the LAM (*Laboratoire d’Acoustique Musicale, Paris*) seminar 2003-2004.

**Participation** to the organisation of the European Research Training Network MOSART (Music Orchestration Systems in Algorithmic Research and Technology) 2000-2004.

**Reviews** for the ICMC2004 (*International Computer Music Conference 2004*).

**Chairman** for the CMMR2004 (*Computer Music Modeling and Retrieval 2004*) symposium.

## Other Skills and Interests

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<b>Languages</b>	<b>French</b> : mother tongue. <b>English</b> : fluent. <b>German</b> : reasonable. <b>Dutch</b> : basic knowledge (two years courses at the Dutch Institute in Paris).
<b>Programming</b>	C++, Matlab, Html, Latex.
<b>Other activities</b>	Piano (conservatory diploma). Organization of concerts at the center for contemporary music, Marseille. Voluntary for a disables association (two years).

## Publications

### Reviewed articles :

- **Bensa J., Bilbao S., Kronland-Martinet R., Voinier T. and Smith J.O.**, Computational modeling of stiff piano strings using digital waveguides and finite differences, *To be published in Acustica special issue on strings*.
- **Bensa J., Jensen K. and Kronland-Martinet R.**, A Hybrid Resynthesis Model for Hammer-Strings Interaction of Piano Tones, *EURASIP Journal on Applied Signal Processing*, Vol. 2004, No. 7, pp.1021-1035 (2004).
- **Bensa J., Bilbao S., Kronland-Martinet R. and Smith J.O.**, The Simulation of Piano String Vibration: From Physical Models to Finite Difference Schemes and Digital Waveguides, *Journal of the Acoustic Society of America*, Vol. 114, No. 2, pp. 1095-1107 (2003).
- **Aramaki M., Bensa J., Daudet L., Guillemain P. and Kronland-Martinet R.**, Resynthesis of coupled piano string vibrations based on physical modeling, *Journal of New Music Research* Vol. 30, No.3, pp. 213–226 (2002).

- **Aramaki M., Bensa J., Daudet L., Guillemain P. and Kronland-Martinet R.**, Synthèse de sons musicaux: des modèles mécaniques aux modèles de signaux, *Revue de l'Electricité et de l'Electronique* (2), pp. 59–67 (Fev. 2001).

#### Book chapter :

- **Bensa J., Dubois D., Kronland-Martinet R. and Ystad S.**, Perception and cognitive evaluation of a piano synthesis model, *Ed. Springer-Verlag, Lecture Notes in Computer Science (to be published)*.

#### Proceedings :

- **Bensa J., Dubois D., Kronland-Martinet R. and Ystad S.**, A cognitive approach to piano timbre, *Proceedings of the Computer Music Modeling and Retrieval Symposium (CMMR2004)*, Esbjerg, Denmark (2004)
- **Bensa J. and Daudet L.**, Efficient modeling of “phantom” partials in piano tones, *Proceedings of the International Symposium on Musical Acoustics (ISMA2004)*, Nara, Japan (2004)
- **Bensa J., Bilbao S., Kronland-Martinet R. and Smith J.O.**, A Power Normalized Non-Linear Lossy piano Hammer, *Proceedings of the Stockholm Music Acoustics Conference (SMAC2003)*, Stockholm, Sweden (2003)
- **Bilbao S., Bensa J., Kronland-Martinet R. and Smith J.O.**, The Wave Digital Piano Hammer: A Passive Formulation, *144th Meeting of the Acoustical Society of America, Journal of the Acoustic Society of America, Cancun, Mexico* (2002)
- **Bensa J., Bilbao S., Kronland-Martinet R. and Smith J.O.**, Piano string modeling: From partial differential equations to digital waveguide model, *144th Meeting of the Acoustical Society of America, Journal of the Acoustic Society of America, Cancun, Mexico* (2002)
- **Bensa J., Bilbao S., Kronland-Martinet R. and Smith J.O.**, From the Physics of Piano Strings to Digital Waveguides, *Proceedings of the International Computer Music Conference (ICMC2002)*, Göteborg, Sweden (2002)
- **Bensa J., Gipouloux O. and Kronland-Martinet R.**, Optimization Techniques and Piano Hammer/String Interaction Modeling, *Proceedings of the Mosart workshop, Barcelona, Spain* (2001)
- **Bensa J., Gipouloux O. and Kronland-Martinet R.**, Understanding the influence of physical parameters on piano sound by the use of an optimization method, *Proceedings of the International Symposium of Musical Acoustics (ISMA2001)*, Perugia, Italy (2001)
- **Bensa J., Gibaudan F., Jensen K. and Kronland-Martinet R.**, Note and Hammer Velocity Dependence of a Piano String Model Based on Coupled Digital Waveguides, *Proceedings of the International Computer Music Conference (ICMC2001)*, Havana, Cuba (2001)
- **Aramaki M., Bensa J., Daudet L., Guillemain P. and Kronland-Martinet R.**, Synthesis of musical sounds: from mechanical models to signal processing models, *Proceedings of the Physics in Signal and Image Processing (PSIP'2001) conference, Marseille* (2001).
- **Aramaki M., Bensa J., Daudet L., Guillemain P. and Kronland-Martinet R.**, Synthesis Model of Piano Strings Vibrations using Coupled Waveguides, *Proceedings of the 5<sup>ème</sup> Congrès Français d'Acoustique (CFA '2000)*, Lausanne (2000).
- **Bensa J., Jensen K. and Kronland-Martinet R.**, Perceptual and Analytical Analysis of the effect of the Hammer Impact on the Piano Tones, *Proceedings of the International Computer Music Conference (ICMC2000)*, Berlin, Germany (2000)

- **Aramaki M., Bensa J., Daudet L., Guillemain P. and Kronland-Martinet R.**, Resynthesis of coupled piano strings vibrations based on physical modeling, *Proceedings of the Digital Audio Effects Workshop (DAFx'1999), Trondheim, Norway* (1999).