東京大学大学院工学系研究科専攻間横断型教育プログラム
「機械システム・イノベーション」

東京大学 THE UNIVERSITY OF TOKYO

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Nonlinear Circuits and Bistable Oscillators for Vibration Energy Harvesters

Professor Adrien BADEL

SYMME - Université Savoie Mont Blanc

日 時：2015年5月26日（火） Tuesday., May. 26, 2015 15:00-16:30
場 所：東京大学工学部2号館232講義室 Eng. Bld. No.2, 3F 232 Lecture Room

要旨

Piezoelectric vibration-based energy harvesters generate alternative voltages that have to be rectified and regulated to supply wireless sensor nodes for example. The usual way consists in using a diode-based rectifier followed by a voltage regulator. However, this approach has been shown to be sub-optimal, especially in the case of harvesters with weak electromechanical coupling.
Advanced energy harvesting strategies have been proposed to improve the energy extraction. Nonlinear circuits based on electronic switches synchronously driven along with the vibrations attracted much attention. This talk will present the working principle of these techniques, their advantages for the harvested power (peak power and bandwidth enhancements) as well as their practical implementations.
From the mechanical point of view, vibration-based energy harvesters usually implement linear mechanical oscillators (such as cantilever beams with tip mass) to amplify the ambient vibration. The generator bandwidth is then limited by the narrow band response of the linear mechanical oscillator. To widen the frequency response, bistable mechanical oscillators are a proven alternative. This talk will also present such bistable generators, and how they can be soundly combined with nonlinear energy harvesting circuits.

He is now an associate professor at the Laboratory of Systems and Materials for Mechatronics from the Université de Savoie, Annecy, France. His research interests include energy harvesting, vibration damping and piezoelectric actuators modeling and control.

主催：
東京大学大学院工学系研究科「機械システム・イノベーション」プログラム（GMSI）
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