

Power Optimization for Piezoelectric Vibrations Energy Harvesters with Material Tailoring

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Abstract:	<p>This work tailors piezoelectric materials properties using the homogenization method to achieve higher electrical power output for the unimorph piezoelectric harvester configuration. Two piezoelectric materials are considered for this purpose: BaTiO₃ and PZN-4.5%PT single crystals. Each piezoelectric material is tailored as a single crystal, polycrystalline or as a piezocomposite with polymer PVDF-TrFE. The tailored or homogenized properties are calculated based in the method of asymptotic homogenization which is implemented using the finite element method. A computational model is developed to optimize the harvester power output for various loadings. The different harvesters are tuned for ambient vibrations and modelled using the finite element method. As design variables one considers, for the single crystal its orientation, for the polycrystalline material the microstructural orientation distribution of the grains and for the piezocomposite the piezoelectric grains orientations, unit cell piezoelectric material volume fraction and polymer orientation. To do the optimization a simulated annealing algorithm is used. Several examples are presented and discussed considering harvester excitation near and far away resonance frequency. A sensitivity study for the electric circuit resistance is performed.</p>



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Author Notification

2 messages

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Wed, Feb 25, 2015 at 3:49 PM



Dear Agostinho Matos,

Thank you for submitting your work to the 7th ECCOMAS Thematic Conference on Smart Structures and Materials – SMART2015.

We are pleased to announce that your abstract ID 147 *"Power Optimization for Piezoelectric Vibrations Energy Harvesters with Material Tailoring"* was accepted for oral presentation at the conference.

We kindly ask you to reply to this e-mail and send us the following information about all authors of your abstract:

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You can find the full-length paper template and instructions for Word and LaTeX in the Conference webpage, authors' area.

Please note the **deadline for full-paper submission is April 15, 2015**.

Presenting Authors should have a **completed registration by April 01, 2015** in order to ensure Abstract/Paper publication. Only one presentation per registered author will be considered.

If you are the presenting author, you should include the abstract ID **028** in the registration form.

Due to the proximity to the summer season, we strongly advise you to **book your flights and hotel, as soon as possible**.

Please check the Conference webpage for registration and important dates.

<http://www.dem.ist.utl.pt/smart2015/index.php/authors/important-dates>

If you have any questions, please contact us by e-mail (smart2015@dem.ist.utl.pt).

Looking forward to meet you in Ponta Delgada next June.

With our best regards

The organizing committee

Agostinho Matos <ago.matoz@gmail.com>
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Tue, Mar 31, 2015 at 10:41 AM

Hi,

below goes the requested information.

Kind Regards
Agostinho

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