Simultaneous wind and solar energy harvesting with inverted flags

Reference: The paper, "Simultaneous wind and solar energy harvesting with inverted flags" is being published in the journal Applied Energy by Jorge Silva-Leon, Andrea Cioncolini, Mostafa R. A. Nabawy, Alistair Revell & Andrew Kennaugh DOI: 10.1016/j.apenergy.2019.01.246

Wind-energy-harvesting generators based on inverted flag architecture are an attractive option to replace batteries in low-power wireless electronic devices and deploy-and-forget distributed sensors. This study examines two important aspects that have been overlooked in previous research: the interaction between an inverted flag and a neighboring solid ...

This paper presents results from experiments and simplified numerical simulations on the flow-induced dynamics and power generation of inverted flags that combine flexible piezoelectric ...

The study, conducted by researchers at The University of Manchester, is the most advanced of its kind to date and the first to simultaneously harvest wind and solar energies using inverted ...

This paper presents results from experiments and simplified numerical simulations on the flow-induced dynamics and power generation of inverted flags that combine flexible piezoelectric strips with photovoltaic cells to simultaneously harvest kinetic wind energy and solar radiant energy. Experiments were conducted in a wind tunnel under controlled wind excitation and light ...

DUAL PIEZO-SOLAR ENERGY HARVESTING "mechanical fish". However, the capabilities of this synergetic configuration are yet to be explored for an inverted cantilever flag located in a flowing fluid.

The focus of Silva-Leon et al was the simultaneous harvesting of wind energy and solar radiant energy, so they did not seek to provide a systematic assessment of composite inverted flags under pure wind excitation. As such, the influence of the geometric parameters of the composite inverted flag on its dynamics and power generation remains unknown.

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Preliminary tests carried out with this first batch of dual wind-solar inverted flags indicated the potential of this concept but also highlighted a structural limitation of this design [62] in ...

The inverted flags are made using piezoelectric strips that harvest energy as the device flaps around in the wind and flexible photovoltaic cells which capture solar energy Dr. Mostafa Nabawy, The ...

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This paper presents results from a practical assessment of the endurance of an inverted flag energy harvester, tested over multiple days in a wind tunnel to provide first insights into flapping fatigue and failure. The inverted flag is a composite bimorph, composed of PVDF (polyvinylidene difluoride) strips combined with a passive metallic core to provide sufficient ...

Simultaneous wind and solar energy harvesting with inverted flags. Jorge Silva-Leon, Andrea Cioncolini, Mostafa R.A. Nabawy, Alistair Revell and Andrew Kennaugh. Applied Energy, 2019, vol. 239, issue C, 846-858 . Abstract: This paper presents a novel wind/solar energy-harvesting device based on the inverted flag concept that combines flexible piezoelectric strips with ...

In this work, we report a new and robust approach to harvest ambient wind energy using a piezoelectric flag fixed at the trailing edge and the leading edge free to move called "inverted flag" (Fig. 1 (a)). A previous experimental investigation showed that a flexible membrane fixed in this configuration could induce self-oscillations with large amplitudes via adjustments ...

To systematically investigate the effects of mass (M *) and aspect ratios (W/L) of inverted piezoelectric flags on the energy harvesting performance, we conducted parametric experimental studies with controlled wind conditions.Experiments were performed in a wind tunnel (Fig. 1(b)) with a cross-section of 1? × 1? (0.3 m × 0.3 m) capable of producing a free-stream ...

AB - This paper presents a novel wind/solar energy-harvesting device based on the inverted flag concept that combines flexible piezoelectric strips with flexible photovoltaic cells to simultaneously harvest both wind and solar energy.

T1 - An Experimental and Computational Study on Inverted Flag Dynamics for Simultaneous Wind-Solar Energy Harvesting. AU - Cioncolini, Andrea. AU - Nabawy, Mostafa R.a. AU - Silva-leon, Jorge. AU - O"connor, Joseph. AU - Revell, Alistair. PY - 2019. Y1 - 2019

Wind-energy-harvesting generators based on inverted flag architecture are an attractive option to replace batteries in low-power wireless electronic devices and deploy-and-forget distributed sensors.

DOI: 10.1016/j.apenergy.2019.01.246 Corpus ID: 117600044; Simultaneous wind and solar energy harvesting with inverted flags @article{SilvaLeon2019SimultaneousWA, title={Simultaneous wind and solar energy harvesting with inverted flags}, author={Jorge Silva-Leon and Andrea Cioncolini and Mostafa R. A. Nabawy and Alistair J. Revell and Andrew Kennaugh}, journal={Applied ...

Conversely, when wind flows across the leading edge of flags and results in reciprocating flapping motion, they are called "inverted flags". Wind energy harvesters based on inverted flags can be ...

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Wind-energy-harvesting generators based on inverted flag architecture are an attractive option to replace batteries in low-power wireless electronic devices and deploy-and-forget distributed ...

Simultaneous wind and solar energy harvesting with inverted flags ... wind/solar energy-harvesting device based on the inverted flag concept that combines flexible piezoelectric strips with ...

The study of the dynamics of cantilevered thin flexible plates in reverse axial flow - also known as inverted flags - has become of significant interest, partly due to their energy harvesting potential. This paper presents fresh experimental results, aiming to enhance our understanding of the dynamics of inverted flags, particularly concerning stability and global ...

This paper presents a novel wind/solar energy-harvesting device based on the inverted flag concept that combines flexible piezoelectric strips with flexible photovoltaic cells to simultaneously harvest both wind and solar energy. Three inverted flags built using off-the-shelf components were experimentally investigated under controlled wind and ...

1 Simultaneous wind and solar energy harvesting with inverted flags Jorge Silva-Leona,b, Andrea Cioncolinia, Mostafa R. A. Nabawya, Alistair Revella, Andrew Kennaugha a School of Mechanical ...

Energy harvesting for low-power sensing has drawn great attention, but still faces challenges in harnessing broadband random motions. Inspired by the parasitic relationship in plants, a host ...

Simultaneous wind and solar energy harvesting with inverted flags. J Silva-Leon, A Cioncolini, MRA Nabawy, A Revell, A Kennaugh. ... An experimental and computational study on inverted flag dynamics for simultaneous wind-solar energy harvesting. A Cioncolini, MRA Nabawy, J Silva-Leon, J O"connor, A Revell. Fluids 4 (2), 87, 2019. 26:

Preliminary characterization of the inverted flag response: (a) amplitude of motion, (b) flapping frequency, and (c) power output versus wind speed, for both increasing and decreasing wind speed.

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