

PHYSICAL MATHEMATICS SEMINAR

Flag flutter and energy harvesting

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ABSTRACT:

When flags flutter, they harvest the wind kinetic energy and produce periodic oscillations. Motivated by this simple principle, we will focus on the flag dynamics in the air, revisiting the works carried out these last years about this subject.

To start, we study the flapping moment (flapping torque) applied by a flag to its flagpole in a wind tunnel. We observe strong differences of flapping moment for different regimes of flutter characterized by a constant number of nodes. These observations are consistent with a linear stability analysis of the problem.

When the rigid flagpole becomes itself a (soft) mass-spring oscillator, we report a strong coupling between the motion of the flag and the rotation of the flagpole, with a clear frequency lock-in phenomenon that can be studied further.

TUESDAY. NOVEMBER 10, 2015

2:30 PM

Building E18, Room 466A

*Reception following in Building E17, Room 401A
(Math Dept. Common Room)*

<http://math.mit.edu/pms/>