Homework 10 (AME30341, Fall 2017, Due on Dec 7)

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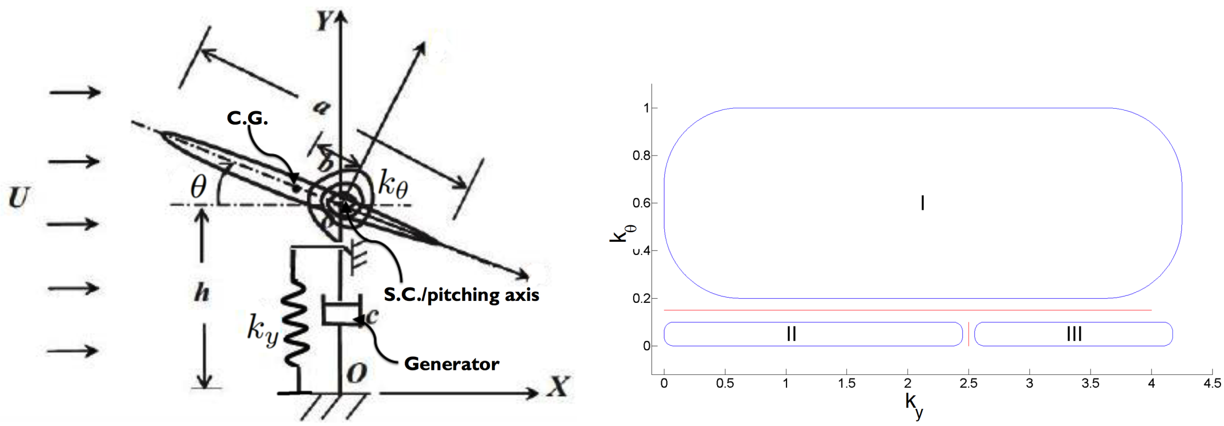

Figure 1:

1. (8 points) Run the Fortran code (wingflutter17nov25.f, uploaded in Sakai) for the following two cases of the wing flutter as shown in Fig. 1 (left) on the Engineering Library machines and visualize the vorticity field using the Matlab code (HW10.m). Discuss the results and print the Matlab visualization figures of vorticity fields.

- $k_y = 0.6$, $k_\theta = 0.1$
- $k_y = 0.6$, $k_\theta = 0.6$

Hints: Step 1. To compile the code
ifort wingflutter17nov25.f -o wing
to run the code
./wing
Step 2. Set k_θ and k_y in the input.dat as
Stiffness of Heaving Spring and Pitching Spring
k_y , k_θ
Step 3. To visualize it using matlab, set maxfort = the maximum number you got in fort.?? files. For example, if you got fort.10, fort.11, ..., fort.87, set maxfort=87

2. (2 points) In the phase diagram of Fig. 1 (right), for behavior type II with both pitching and heaving motions, try to find the maximum mean power output of the generator by designing a set of k_y, k_θ, and b (distance between CG and SC). To calculate the mean power output of the generator
ifort postprocess.f -o postprocess
./postprocess
To join the prize contest for the best design (maximum mean power output) of this energy harvesting device, you must send me your homework in PDF version by Dec 6 night.
You can look at the student HW10 examples submitted in 2015 and 2016 for reference (uploaded in Sakai). In addition, Fig. 10a in my paper (PhysFluids2009b.pdf, uploaded in Sakai) might be useful as well, in which $k_y = 0$.