A Numerical Investigation of TBA.....!!!1

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Chapter 1

A review of the literature

1.1 Flow induced vibrations

1.2 Fluid-elastic galloping

Fluid-elastic galloping is one of the most commonly observable flow-induced vibration on a slender body. Since this phenomenon is most common in civil structure, such as buildings and iced-transmission lines, the term “aeroelastic galloping” is commonly used.In order for the system to be aeroelastic the . However, this mechanism can occur on a slender body immersed in any Newtonian fluid. This work is based on a general Newtonian flow, and therefore the term “ fluid-elastic galloping is used.

1.2.1 Cause of galloping

Galloping is occurred due to the instantaneous lift caused by interaction of the shear layers of the body moving in a flowing fluid. The phenomenon could be explained using a square cross section as an example.

1.2.2 Qusasi-state theory

According Païdoussis et al. (2010), Glauert (1919) provided a criterion for galloping by considering the auto-rotation of an aerofoil and Den Hartog (1956) has provided a theoretical explanation for iced electric transmission lines. However, the study by Parkinson and

Smith (1964) could be identified as the pioneering study of galloping. A weakly non-linear oscillator model was developed by them to predict the response of the system. Essentially the quasi-steady assumption was made to develop this theory assuming that the instantaneous lift force of the oscillating body is equal to that of the lift force generated by the same body at the same induced angle of attack at the fixed support scenario.

The oscillator equation was solved using the Krylov and Bogoliubov method. Details of this method would not be mentioned as it is not used in the present study to solve the oscillator equation. The results obtained form experiments carried out at $Re = 2200$ and a mass ratio around 1164 had a good agreement with the theoretical data which is shown in Parkinson amplitude data the figure.

Bibliography

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