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AN ADDITIONAL NOTE ON "DYNAMIC STABILITY OF COLUMNS SUBJECTED TO FOLLOWER LOADS: A SURVEY" (M. A. LANGTHJEM and Y. SUGIYAMA 2000 *Journal of Sound and Vibration* 238, 809–851)

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The authors of reference [1] are to be commended for implementing this excellent and useful survey on the dynamics of simple, flexible structural elements subjected to non-conservative forces.

Since they did not feel the need to extend the ample literature review on the studies of two-degree-of-freedom models, control theory and applications, it is the purpose of this note to point out the existence of a generalization on a *canonical problem*, such as Smith–Herrmann's problem (see reference [63] of the survey). The cited investigators developed their interesting paper [2] on instability of a uniform cantilever on an elastic foundation with uniform stiffness, and subjected to a follower force. They generalized Beck's [3] paper and arrived at an unexpected result: the critical load of flutter was the same regardless of the presence or absence of the foundation.

Sundararajan [4] interpreted this behavior and an other example was analyzed by Jacoby and Elishakoff [5], who demonstrated that attachment of a discrete-continuous elastic foundation may leave the flutter load of Plüger's column unchanged.

More recently, Elishakoff and Wang [6] considered a case of geometrically dissimilar distributions: a column partially attached to an elastic foundation (Figure 1). Using the Bernoulli–Euler theory, the problem is governed by

$$EI\frac{\partial^4 w}{\partial x^4} + P\frac{\partial^2 w}{\partial x^2} + kU(a-x)w + \rho\frac{\partial^2 w}{\partial t^2} = 0, \tag{1}$$

where w is the transverse displacement, EI the flexural rigidity, P the compressive force, k the foundation modulus, ρ the mass density and $U(a-x)$ is the unit step function, a being the length of the attachment of the foundation to a part of the column.

The problem was solved by the two-term Galerkin method and the derivation was carried out with the aid of computer manipulation algebra. The interesting phenomenon observed by Smith and Herrmann [2] is re-established for total attachment, while for partial attachment the flutter load is found to increase up to an optimum attachment ratio which maximizes the flutter load.

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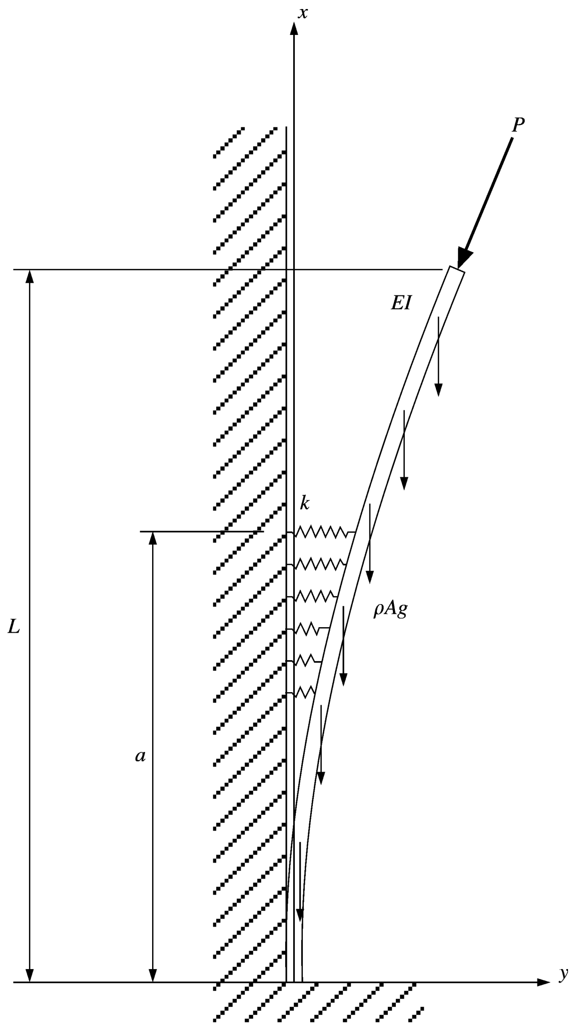

Figure 1. Problem analyzed by Elishakoff and Wang [6]. (A is the cross-sectional area of the column).

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