

ANALYSIS OF CROSSING AND VEERING PHENOMENA IN PLANAR FRAME STRUCTURES

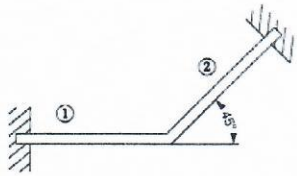
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ABSTRACT

In this paper, crossing and veering phenomena are discussed for a two-element frame consisted of beams of constant circular cross-sectional area, mass density and modulus elasticity, see Fig. 1. Depending on the mechanical characteristics of frames when two natural frequencies approach one another over the range of the diameter, their loci may cross or repel. Thus, phenomena of crossing and veering are introduced [1]. These phenomena have been thoroughly studied analytically using various discretization methods as in [2] and [3]. While experimental data on these topics are rather scarce, some experimental studies are given in [4]. An analytical solution for the presented problem is proposed in this paper.



$$L_1 = L_2 = 1\text{m}; D_1 = D_2 = D$$

$$E_1 = E_2 = E$$

Figure 1. Frame scheme

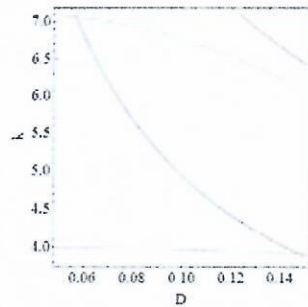


Figure 2. Eigenvalue loci

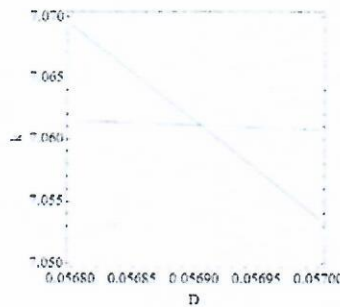


Figure 3. Loci crossing

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