Journal of Sound and Vibration (1998) **213**(2), 375–376

LETTERS TO THE EDITOR

COMMENTS ON "HIERARCHICAL FINITE ELEMENT ANALYSIS OF THE VIBRATION OF MEMBRANES"

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(*Received* 28 *July* 1997)

The author is to be congratulated for developing a very efficient and accurate hierarchical finite element for the vibration of membranes [1].

Since the problem is governed by the Helmholtz equation,

$$\nabla^2\psi + \lambda^2\psi = 0, \tag{1}$$

and the boundary condition

$$\psi[L(x, y) = 0] = 0, \tag{2}$$

where $L(x, y) = 0$ defines the contour of the domain, the approach developed by Houmat [1] is applicable in the case of TM modes in electromagnetic prismatic waveguides and acoustic wave propagation when dealing with soft walled conduits.

It is also important to recall that the problems of: (a) transverse vibrations and (b) elastic stability under in-plane hydrostatic loading of thin, simply supported, polygonal plates reduce, also, to the solution of the differential system (1) and (2). Consequently the square of the eigenvalues of polygonal membranes,

$$\Omega_m^2 = \rho/S\omega_m^2 a^2,$$

where "a" is a characteristic length, constitute the frequency coefficients,

$$\Omega_p = \sqrt{\rho h/D}\ \omega_p a^2,$$

and the buckling parameters† $(N/D)a^2$, of thin, simply supported polygonal plates of the same shape.

Consequently the values of Ω depicted in Table 3 of reference [1] of the L-shaped membrane are applicable to vibrating L-shaped thin elastic plates and also to the elastic stability situation. The analogy is also valid in the case of simply supported polygonal sandwich plates [2, 3].

ACKNOWLEDGMENTS

Research on dynamics of structural elements is sponsored by CONICET PIA 6002/96 and by Secretaría General de Ciencia y Tecnología of the Universidad Nacional del Sur.

† In the case of the elastic stability problem only the lowest value of Na^2/D is usually of interest.

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