Structural Vibration (Exact Solutions for Strings, Membranes, Beams, and Plates)
C. Y. Wang and C. M. Wang, CRC Press, Boca Raton, LA USA, (2013), 307 pp., 149.95 USD, ISBN 9781466576841

When I volunteered to review *Structural Vibration* I jokingly stated that if our editor had a book of closed form solutions for curved monumental stair vibration that he wanted reviewed, I would gladly review and buy it. On my very first flip through the book, the illustration on page 171 popped out, a four coil annular sector plate looking remarkably similar to the problem I had been wrestling with. Curved monumental stairs can help make a project look awesome but can also cause climacophobia if it vibrates past ISO recommended acceleration limits. One step in predicting acceptability of a stair design is to calculate its zero node frequency. It hadn't occurred to me to look at curved stairs as an annular sector plate, so I was interested in seeing how well the table on page 175 predicted the stair vibration frequencies I already knew.

Stair #1 is 22,500 pounds, with an inside radius of 18.5 ft., outside radius of 25 ft., and 92 degree curve, with a bending moment of inertia of 2181 in^4. Its zero radial node frequency was measured to be 4.4 $\pm$ 0.2 Hz. From Table 5.26, *Structural Vibration* predicts a zero node frequency of 4.25 Hz. Interesting!

Stair #2 is 16,000 pounds, with an inside radius of 7.2 ft., outside radius of 13 ft., and 180 degree curve, with a bending moment of inertia of 1393 in^4. From FEA analysis, its zero radial node frequency is 9.3 Hz and its single radial node frequency is 17.2 Hz. From Table 5.26, there is no zero node frequency (since a 180 degree pinned annular sector plate rotates like a hinge) but the single radial node frequency is given as 17.7 Hz, matching that of the FEA analysis. Sold! A few back calculations later and I've now got a table which predicts curved monumental stair vibration.

Like any other book of tables, there are a few transcription errors, but nothing major. *Structural Vibration* is an easy reference book to use. Each section has ample introduction, explanations and illustrations of the analyses. The history of each type of analysis is given along with the original references.

This book earns a place in my library between my copies of Roark's Formula's for Stress and Strain and CRC's Standard Mathematical Tables.

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