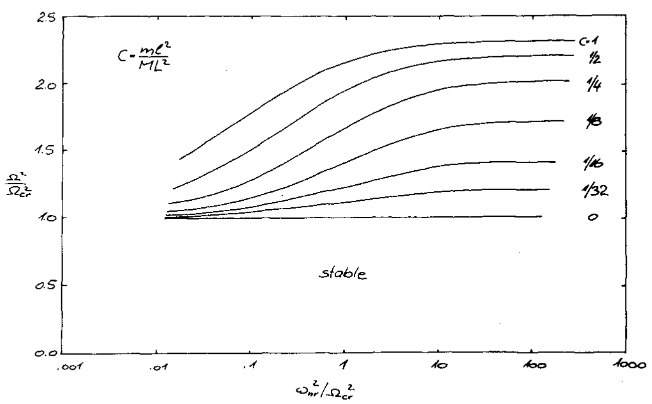

Fig. 3 Stability boundaries in plane for $\ell_2/L = 0$.

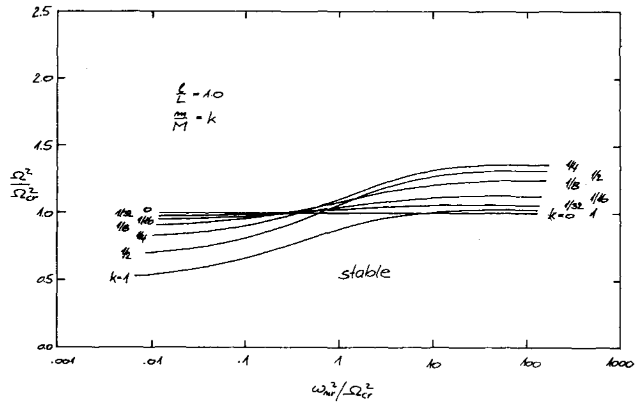

Fig. 4 Stability boundaries in plane for $\ell_2/L = 0.75$.

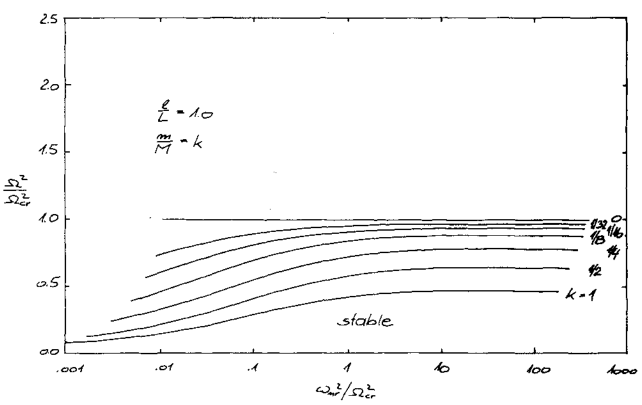

Fig. 5 Stability boundaries out of plane for $\ell_2/L = 0.75$.

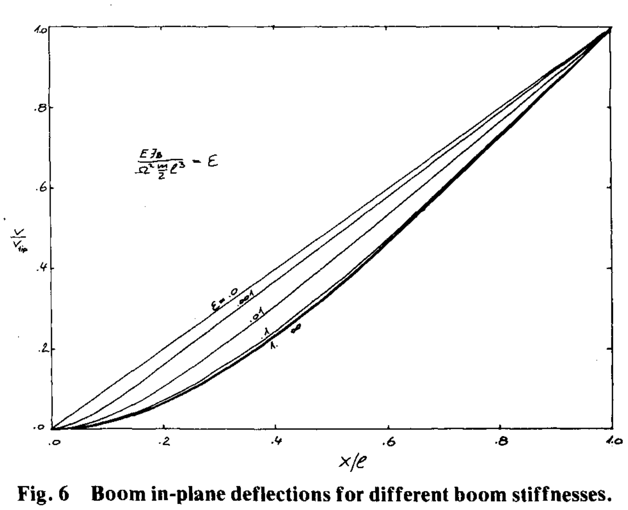

Fig. 6 Boom in-plane deflections for different boom stiffnesses.

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Reply by Authors to P. Kulla

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THE comments of Kulla are appreciated. They provide an important check on the results of Ref. 1 by an alternative method of analysis and provide further insight into the problem.

The observation that the stability boundaries should be somewhat lower than originally reported for shafts with very large rigid beam appendages is confirmed. Convergence rates are found to deteriorate for these cases so that ten terms may not be sufficient in this region. Inclusion of additional terms tends to lower these boundaries as reported by Kulla. Although the stability boundaries are generally much less sensitive to further refinement of the radial beam representation than to that of the shaft, particularly for the relatively rigid beams as noted by Kulla, inclusion of additional terms for the radial beam can also be accommodated in the original analysis if so desired.

Reference 1 does not imply that out-of-plane effects are nonexistent. The study was restricted to the presentation of results for in-plane beam deformations because their effects were considered to be most interesting and important. Considerations of out-of-plane beam deformations are also included in the more complete treatment in Ref. 2. However, Kulla's plot in Fig. 5 is new.

Equation (3) of Ref. 1 contains a typographical error and should be corrected to read

$$T_b = \frac{\Omega^2}{2}\int_0^{\ell} \gamma A\Big\{2u^2(d) + 2v^2(d) - \tfrac{1}{2}(\ell^2 - y^2) \times \Big[\Big(\frac{\partial \eta_1}{\partial y}\Big)^2 + \Big(\frac{\partial \eta_2}{\partial y}\Big)^2\Big] - 2y^2\theta_1^2 - 2y(\eta_1 + \eta_2)\theta_1\Big\}\mathrm{d}y$$

This correction does not affect any previously reported results.

References

[1]Wilgen, F.J. and Schlack, A.L., Jr., "Effects of Radial Appendage Flexibility on Shaft Whirl Stability," *AIAA Journal*, Vol. 15, Oct. 1977, pp. 1531-1533.

[2]Wilgen, F.J., "The Effect of Appendage Flexibility on Shaft Whirl Stability," Ph.D. Dissertation, Dept. of Engineering Mechanics, Univ. of Wisconsin, Madison, Wis., 1977.

Received June 30, 1978.

Index categories: Propeller and Rotor Systems; Rotating Machinery.

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