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Concerning the paper by P. Zitnan: "VIBRATION ANALYSIS OF RECTANGULAR AND SKEW PLATES BY THE RAYLEIGH-RITZ METHOD" in JSV (1999) 221(2), 342-349.

This paper involves a numerical procedure utilizing B-spline trial functions to determine natural frequencies.

In much numerical work, there is the question of benchmarking obtained solutions against known exact solutions, if available, in order to determine their accuracy. It may be worth pointing out that, for simply-supported plates with straight edges, the membrane-plate analogy allows one to write down the plate eigenfunctions and frequencies if those of the fixed-edge membrane of the same shape are known. For shapes which can be drawn on a square grid with diagonals, including shapes with holes, a subset of modal functions and frequencies can be written down explicitly and exactly [1].

Although these do not in general include the fundamental, the numerical modes could doubtless be identified from the frequency value and especially by the mode shape if also available. Thus the accuracy of these quantities could be checked.

The above paper applies the B-spline numerical method to clamped plates. If the case of simply supported plates were pursued, some exact results in Ref.[1] are available for comparison.

Further ideas along these lines were developed in the Appendix of Ref.[2], in connection with more complicated, isospectral, shapes.

1. H.P.W. GOTTLIEB 1985 Journal of Sound and Vibration 103, 333-339. Exact vibration solutions for some irregularly shaped membranes and simply supported plates.
2. H.P.W. GOTTLIEB and J.P. McMANUS 1998 Journal of Sound and Vibration 212, 253-264. Exact shared modal functions and frequencies for fixed and free isospectral membrane shapes formed from triangles.