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# DISCUSSION OF: FINITE STRIP-DIFFERENCE CALCULUS TECHNIQUE FOR PLATE VIBRATION PROBLEMS[1]

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The analytical solution presented by the authors is applicable to orthotropic rectangular plates having all four edges simply supported. Compared with the conventional finite strip method, it offers computational advantages in that execution time is practically independent of the number of strips, $N_s$.

However, the writer does not agree with the authors' assessment of relative accuracy and convergence of the two methods in question. In particular it would appear that the results presented in Fig. 2 of the paper for the conventional (finite strip) method are in error. By way of comparison, results obtained by the writer using a finite strip analysis, with masses lumped at the strip interfaces, are tabulated below. These are practically identical with those plotted in Fig. 2 for the difference calculus technique.

It should be noted that more rapid convergence to the exact solution is afforded by the finite strip method when a consistent mass matrix is adopted in lieu of lumped line masses (refer Table 1). Here an upper bound solution is obtained, as distinct from the lower bound solution given by the lumped mass approximation. The increased accuracy thus available may be achieved with little increase in computation time, and would provide a more suitable basis of comparison with the authors' method.

Table 1. Finite strip results for example plate

| $N_s$ | $\omega_{11}^2$ | $\omega_{12}^2$ | $\omega_{13}^2$ | $\omega_{14}^2$ | $\omega_{15}^2$ |
|---|---|---|---|---|---|
| 2 | 137·2† | | | | |
| | 152·3‡ | | | | |
| 3 | 150·1 | 336·4 | | | |
| | 152·2 | 392·3 | | | |
| 4 | 151·7 | 376·1 | 849·2 | | |
| | 152·2 | 390·5 | 1048 | | |
| 5 | 152·1 | 385·1 | 967·8 | 1925 | |
| | 152·2 | 390·0 | 1037 | 2511 | |
| 6 | 152·1 | 387·8 | 1004 | 2227 | 3888 |
| | 152·2 | 389·8 | 1033 | 2474 | 5331 |
| 8 | 152·2 | 389·1 | 1023 | 2386 | 4832 |
| | 152·2 | 389·7 | 1030 | 2448 | 5192 |
| 10 | 152·2 | 389·5 | 1027 | 2418 | 5027 |
| | 152·2 | 389·7 | 1029 | 2440 | 5151 |
| 20 | 152·2 | 389·6 | 1029 | 2434 | 5116 |
| | 152·2 | 389·6 | 1029 | 2436 | 5122 |
| Exact | 152·2 | 389·6 | 1029 | 2435 | 5120 |

†Lumped mass.
‡Consistent mass.

## REFERENCE

1. C. Sundararajan and D. V. Reddy, Finite strip-difference calculus technique for plate vibration problems. *Int. J. Solids Structures* **11**, 425 (1975).