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Letter to the editor

Reply to comments by Robert P. Comer

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In his letter, Comer (1986) addresses three different points which bear on three related publications on load-induced flexure of elastic plates (Comer 1983; Ward 1984; Wolf 1985a). As his first point is primarily an annotation to his own publication on the subject (Comer 1983), I will restrict my reply to the remaining two points.

Comer's (1986) second criticism refers to my statement on similarity (Wolf 1985a, p. 271). If the sentence under discussion has been construed to state that *geometrical* similarity between two otherwise identical plate models implies their *physical* similarity, this represents a misinterpretation. Clearly, non-dimensional analysis of elastic-plate flexure *cannot* be formulated in terms of a geometrical scale-length (see, e.g. Wolf 1984). My statement therefore purports to draw attention to something different: I expect the accuracy of thin-plate theory to be comparable for two models provided that the ratios between horizontal load dimension and plate thickness are comparable. This is obviously not completely supported by Comer's (1983) results (see his fig. 3). Inspection of fig. 2 in Wolf (1985a), however, illustrates that neglecting pre-stress in thick-plate theory overestimates the response. More specifically, the figure shows that the differences increase with horizontal load dimension *and* with plate thickness. As the linear scale of the model in Comer's (1983) fig. 3(c) is larger than the scale of the model in fig. 3(a), I therefore conclude that including pre-stress in his thick-plate theory would reduce the relative discrepancies in fig. 3(c) by more than in fig. 3(a) so that they would become comparable.

For further clarification, I calculate peak deflections for two geometrically similar models. In the first model, disc-load radius and elastic-plate thickness are 200 km; the second model is scaled down by a factor of four (the other parameters are as in Wolf 1985a). Compared with the response according to my thick-plate theory, the thin-plate deflection is reduced by 15 and 10 per cent, respectively. I am therefore entitled to denote the relative discrepancies as 'similar'.

Whereas this is a minor subtlety, Comer's (1986) final comment on the relation between special and general solutions is of greater import. It is certainly legitimate to point out that

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the solutions derived in Comer (1983) and Wolf (1985a) are both subsets to Ward's (1984) solution, although, for correctness, it should at this point also be mentioned that Ward's solution is in turn contained in previously published, yet more comprehensive theories (e.g. Farrell 1972). It is, on the other hand, important to remember that general solutions usually fail to illuminate the physical structure of the underlying phenomena (albeit such solutions may be required for interpretational work). This is necessarily a consequence of the fact that general solutions tend to be complicated. In Wolf (1985a), for example, I was concerned with a discussion of the physical significance of pre-stress. This was extended in Wolf (1985b), where it was shown *why* the inclusion of pre-stress advection is essential to the mathematical analysis of the relaxation of the corresponding Maxwell model. Obviously, this required a tractable closed-form solution which, however, inevitably involved a loss of generality.

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