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Letter to the Editor

Benchmark exact solutions for the static analysis of multilayered piezoelectric composite plates using PVDF

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ABSTRACT

The three-dimensional (3D) exact solutions developed in the early 1970s by Pagano for simply supported multilayered orthotropic composite plates and later in the 1990s extended to piezoelectric plates by Heyliger have been extremely useful in the assessment and development of advanced laminated plate theories and related finite element models. In fact, the well-known test cases provided by Pagano and by Heyliger in those earlier works are still used today as benchmark solutions. However, the limited number of test cases whose 3D exact solutions have been published has somewhat restricted the assessment of recent advanced models to the same few test cases. This work aims to provide additional test cases to serve as benchmark exact solutions for the static analysis of multilayered piezoelectric composite plates. The method introduced by Heyliger to derive the 3D exact solutions has been successfully implemented using symbolic computing and a number of new test cases are here presented thoroughly. Specifically, two multilayered plates using PVDF piezoelectric material are selected as test cases under two different loading conditions and considering three plate aspect ratios for thick, moderately thick and thin plate, in a total of 12 distinct test cases.