

## Chapter Two

# EXACT SOLUTIONS FOR ELASTIC RESPONSE

## LAMINATES

As mentioned earlier, an important consideration in the application of composites is the accuracy of the models used to describe them, in particular, the behavior of laminated systems. In a series of papers, the exact elasticity solutions for various classes of laminates were developed and compared to the respective classical lamination theory results. The problems are solved in a semi-inverse manner and actually represent the effect of a version of simple support, although this is immaterial for the intended purpose, which is to examine the quality of approximate models. As in simple beam theory, interlaminar stresses,  $(\sigma_{xz}, \sigma_{yz}, \sigma_{zz})$ , can also be computed in plate theories by a post-processor integration of the equations of equilibrium of elasticity once the in-plane stresses are determined, and these results are also given. The results achieved in these studies may be somewhat surprising in the sense that the stresses are more accurate than the deflection in the approximate theory despite the zig-zig displacement variation, a clear contradiction of the Bernoulli-Euler hypothesis.