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# Propositions

accompanying the dissertation

## MODELING PROGRESSIVE HIGH-CYCLE FATIGUE IN POLYMER COMPOSITES

by

**Pieter HOFMAN**

1. Modeling fatigue damage as sharp cohesive cracks with strong discontinuities requires an initiation criterion, which is in contradiction with the experimental observation that an endurance limit may not exist.\*
2. The assumption that the local stress ratio is equal to the global load ratio is inaccurate for modeling progressive fatigue in cases of practical interest.\*
3. A continuum model for a composite can provide accuracy similar to that of a micromechanical model, provided that the kinematics and transverse isotropy are correctly represented in the constitutive equations.\*
4. A numerical model should not only be judged by its ability to capture all relevant physical phenomena, but also by its ability to describe them with a small number of parameters obtained from a minimal set of experimental tests.
5. A numerical tangent modulus, based on finite differences, is an essential tool for testing analytically derived tangent moduli.
6. Debugging finite element codes on problems more complex than a few elements is doomed to fail.
7. Research is a highly nonlinear, non-monotonic process with multiple instabilities, requiring adaptive increments to progress efficiently and robustly while preventing premature termination.
8. With the ever-increasing computing power and improved numerical methods, studying fundamentals in mechanics and physics is the most intellectually sustainable thing to do.
9. The idea that mandatory transferable-skill courses will help PhD candidates complete their degrees within the four-year time frame, is wrong. In fact, precious time is wasted.

These propositions are regarded as opposable and defensible, and have been approved as such by the promoters dr.ir. F. P. van der Meer and prof.dr.ir. L. J. Sluijs.

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\*Pertains to this thesis.