

Supplementary materials for Sensitivity Analysis of Hybrid FEM/SPH Numerical Models for Impact Loads on Sandwich Composites

To demonstrate the numerical consistency of the adopted modeling strategy, representative time histories of total, kinetic, and internal energies are presented below (Figs. S1–S3), confirming the stability of the explicit dynamic solution and the absence of non-physical energy growth.

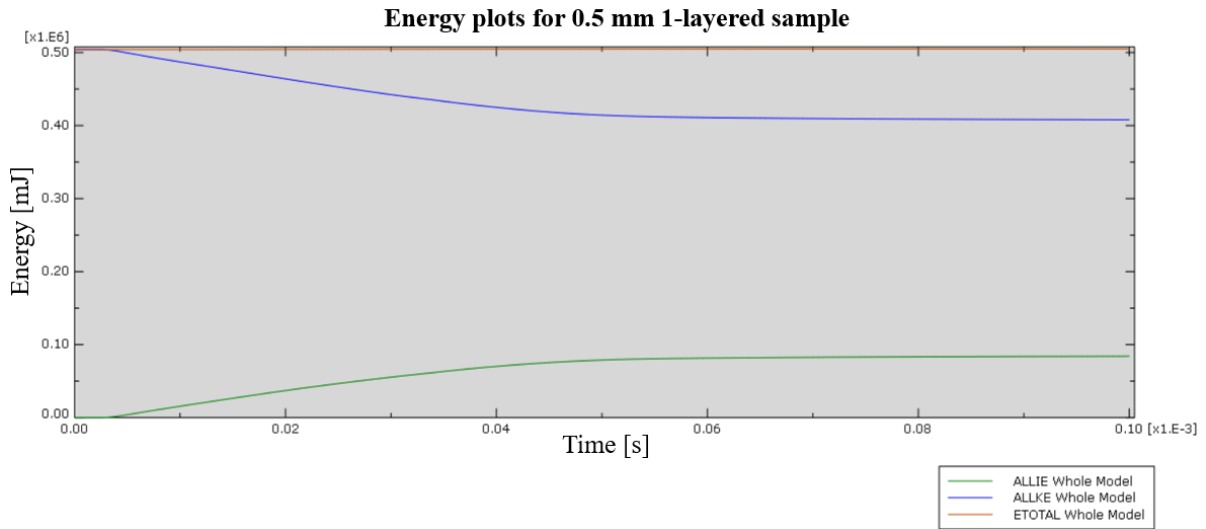


Figure S1. Example energy plots for 1-layered sample to analyse model stability.

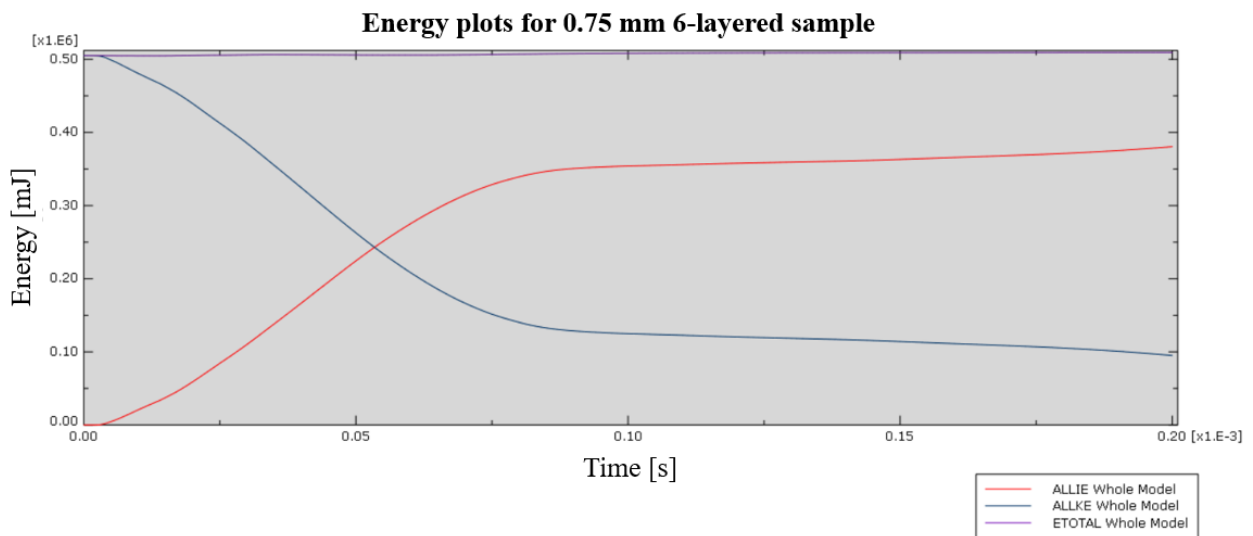


Figure S2. Example energy plots for 6-layered sample to analyse model stability.

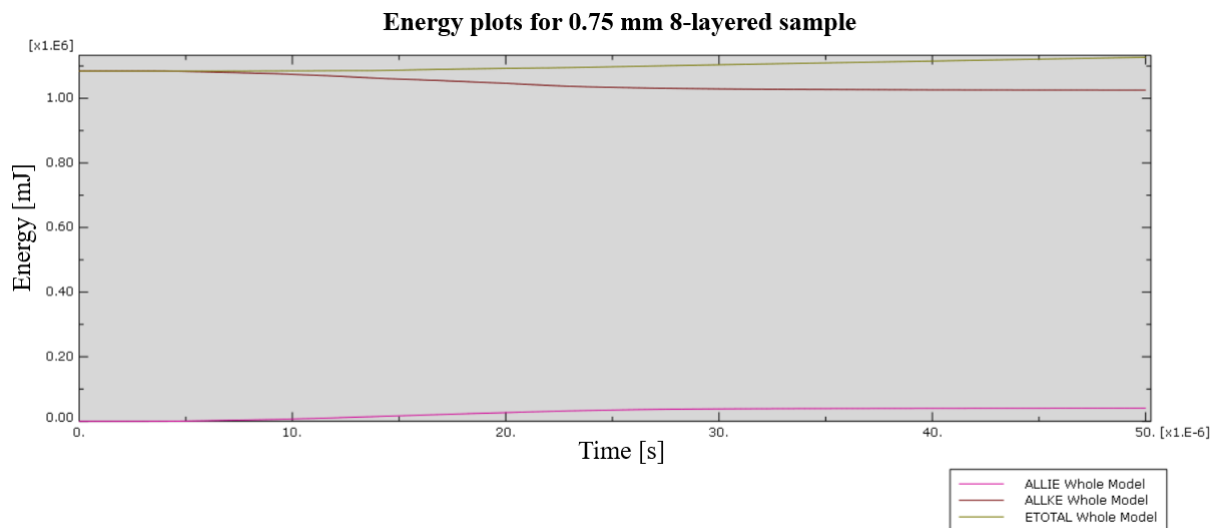


Figure S3. Example energy plots for 8-layered sample to analyse model stability.

The total energy did not increase by more than 1% of its initial value for any of the analysed cases, indicating a stable and physically consistent numerical representation of the process within the explicit computational framework.