3D Surface Reconstruction from Spheremapping Traces*

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We have developed the tools to reconstruct 3D shell surfaces with 10 nm height accuracy and 1° spatial (mode ~300) resolution from intersecting sets of AFM profiles. This is required for proper evaluation of the value of a shell in an implosion, and is a valuable tool for process development. The reconstruction requires a complex mathematical evaluation of the >100 traces needed to cover an entire shell surface. Missing information from spheremapping traces, such as the trace radius (mode 0) and off-centeredness (mode 1), is retrieved by systematically minimizing the discrepancy at each trace intersection where there is only one physical height. Point defects, which are real, and trace artifacts, which are not real, must be treated separately for proper reconstruction of the lower-mode surface. The point defects are retained in the reconstructed surface which makes the R(□, □) map useful as an input to the hydrodynamic simulation code for performance evaluation prior to a ICF shot. Visual identification of low-mode pattern is important to the process engineer as a feedback tool to optimize the shell production.

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