

Calculating strains from noisy displacement fields by a finite element technique

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Summary

Optical full-field measurement methods are now widely applied in various domains. In general, the displacement fields can be directly obtained from the measurement; however in mechanical analysis strain fields are preferred. To extract strain fields from noisy displacement fields is always a challenging topic. In this study, a finite element method for smoothing displacement fields and calculating strain fields is proposed. An experimental test case on a holed aluminum specimen under tension is applied to validate this method. The heterogeneous displacement fields of the area around the hole are measured by the digital image correlation (DIC). By our proposed method, the smoothed displacement fields and strain fields are obtained. The result shows that the measuring noise on experimental displacement fields can be successfully removed, and strain fields can be reconstructed in the arbitrary area.

