Review of manuscript "Measurement of Stress Intensity Factors Using Digital Image Correlation" By: Group F

ME EN 6960

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Synopsis:

In this manuscript stress intensity factors (SIF) for Mode I and mixed mode conditions around a crack are investigated by use of DIC. A thin rectangular specimen made of PMMA with a saw-cut crack is placed in a three-point bend configuration to induce flexural stresses while imaging the face of the plate for DIC. In order to induce Mode I type stresses the specimen is placed symmetrically in the three-point bend fixture and asymmetrically for mixed mode stresses. Experimental results are calculated with displacements found from DIC. Then the Mode I experimental results are compered to theoretical approximations that were found using Westegaard's equations. Mixed mode SIF were also calculated and presented with an estimate of mode mix percentage.

Recommendation: *Accept with minor revisions*

Comments on the technical aspects of the manuscript

The introduction shows that a thorough literature review was done prior to implementation of analysis. However, the fundamental process by which DIC functions is not presented in the introduction, which I

believe would better inform the reader of its context within modern research efforts. The authors motivations as well as the contribution goals of the manuscript are well stated.

The purpose of Figure 7 is somewhat unclear. Either more description or perhaps a different image would add clarity here. Figures 11-14 could be better understood with some additional discussion.

The variable σ_∞ in equation 1 should be defined. Also, it should be mentioned that μ in equation 4 is a Lamé parameter.

In section 4.2 it is stated the non-linear effects of the experimental data are due possibly to error associated with DIC. However, there was no justification for this assumption. It could be possible that the specimen exhibited non-linear deformation as many materials in the real world do.

Comments related to non-technical aspects of the manuscript

This manuscript overall was well written and contained few errors. The document has e a few typographical errors, for example in section 2 in the third paragraph the number "1" in the sentence "...coordinates with respect to the crack tip 1." should be omitted. Additionally, there are some inconsistencies such as, "Mode I" versus "mode I". Errors discussed with the experiment through out section 4.2 could be placed in section 4.3 to help readers associate all possible errors and uncertainties with the experiment. Finally, a few minor format issues were noticed like Figure 6 discussed before Figure 5.