Thermography as a validation technique for experimental-numerical research on fretting fatigue

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More and more researchers use numerical simulations in favour of real experiments. However, only relying on numerical simulations is inadvisable since simulations which might not fully describe the physical problem. More advisable is a coupled numerical-experimental research. This accelerates research while maintaining reliability. To validate and optimise numerical simulations we need to compare results with physical experiments. Numerical simulations of mechanical problems give 2D or 3D results of every parameter involved, e.g. stress, strain, etc. However, due to the nature of mechanical experiments, results are mostly restricted to single values as force, displacement, etc. Comparison of numerical and experimental experiments is hereby limited to single values, nullifying the detail of numerical simulations.

At Ghent University we use, amongst others, thermography to compare numerical and physical experiments. Thermography visualises temperature fields. Temperature changes during an experiment can be related to elastic stress changes. This experimental stress field has been compared with the numerical one during fretting fatigue experiments. A significant degree of similarity between both stress fields has been observed.