

Crack propagation law identification by Digital Image Correlation

P. Boutet^{1,2}, F. Lefebvre¹, F. Hild²

In regular inspections of structures or components, it happens that the presence of cracks is detected. It is therefore important to know if the structure can continue to operate regularly or if a degraded mode of operation has to be considered. In order to make the right choice, it is useful to know as accurately as possible the crack propagation law of the material. Digital image correlation (DIC) is a good means to evaluate crack propagation since it provides information on the displacement field of a studied region. Some instrumented fatigue crack growth tests have thus been carried out and the exploitation of the data is presented.

With a DIC algorithm, the displacement field inside the region of interest is calculated. Based on the study of subsingular and supersingular displacement fields, a post-processing step is performed, and both crack length and stress intensity factor (SIF) are evaluated. A Paris' law is identified, and a parametric study is carried out in order to estimate the influence of some parameters on the identification error. In order to evaluate the relevance of this identification, the error made in this step is also studied. The coefficients of the crack propagation law are finally compared with those found in the literature, and a comparison between the evaluated SIF and the one calculated from the ISO standard is made.

- 1. Cetim, Senlis, France,*
- 2. LMT-Cachan, France*