Review of “Non steady-state intersonic cracks in elastomer membranes under large static strain”

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1 Reviewer #1 (M. Angelillo)

Reviewer The authors declare that the blade speed is set to 60cm per second. How was this value set? Choosing lower or higher speeds would have any effect?

Authors The blade was moved manually so the blade speed was measured afterwards using the images from the high speed camera. It turns out that the speed of the blade is about the same for each test. Nevertheless, we did not observe any impact of the blade speed because this speed is very low compared to the crack speed after a few tenths of a millisecond.

Reviewer After the quasi static propagation regime is overcome, the speed of propagation seems to be correlated to the energy release rate. Would it not be possible to plot the crack speed as a function of this?

Authors Measuring the energy release rate at the end of the propagation is rather tricky since the amount of DIC data around the crack tip is reduced. Then, we believe that our set-up will not be able to measure accurately the energy release rate after the steady-state regime. However, such plot and modification of the set-up accordingly would be interesting and bring further evidence to the phenomenon.

Reviewer The model of Mooney Rivlin is incompressible. As such there is not any longitudinal wave propagation speed. Of course this is just a model and the real material, though nearly incompressible, may well have it. I think it could be interesting to correlate the results obtained experimentally with the longitudinal wave speed of an ideal material of the Blatz-Ko type.

Authors Indeed, this material is incompressible only up to a certain extent. Nevertheless, the behaviour of this polyurethane remains very close to incompressibility at more than 300% tensile deformation (tested in uniaxial tension). A Blatz-Ko model would be therefore unable to faithfully reproduce the tensile behaviour at moderate deformation.

2 Reviewer #2 (A. Pandolfi)

Reviewer The choice of a Mooney-Rivlin type of material does not lead to a perfect superposition of the model with the experimental results (Fig. 5). Perhaps the use of a more sophisticated hyperelasticity model could capture the experimental curves with higher accuracy. There is any reason this model has been adopted? Or the reason is the compatibility with previous studies?

Authors We agree with the reviewer that a slightly more sophisticated model is able to capture the tensile behaviour more accurately (the Ogden model with 3 parameters for instance). However, we
choose the Mooney-Rivlin model to be able to use Boulanger and Hayes formula. A comment has been added on this aspect.

**Reviewer**
The features of the material (Section 3.1.1) should be moved in the section Methods. These are not "results". Also the material properties adopted for the MR model should be moved where the mode is introduced.

**Authors**
We agree with the reviewer and change the position of section 3.1.1. The other corrections and suggestions have also been taken into account.

### 3 Editor’s assessment (A. Pandolfi)

The paper presents a study on intersonic crack propagation in elastomer membranes. Elastomers are materials of large diffusion and interest in the modern industry, but their crack failure at high speeds has not been object of many investigations. The study tries to cover the gap, by presenting a well documented experimental setup where elastomer membranes are accurately tested under different stretch conditions, leading to the novel observation of non-steady crack propagation. Results shed some light on the failure behavior of elastomers and, in agreement with the requirements of JTCAM, deserve to be published.