Contribution ID: **714** Type: **Poster (+) Presentation**

Growth of gas-filled penny-shaped cracks in decompressed hydrogels

Tuesday, 1 June 2021 10:00 (1 hour)

We report experiments in which hydrogels equilibrated with carbon dioxide at elevated pressure experience sudden decompression. The hydrogels remain stable until disturbed by a small impact, which initiates the formation of penny-shaped cracks within the hydrogel. The main radius of these oblate ellipsoids grows linearly in time with a growth rate of the order of 1 cm/minute.
Our quantitative model assumes the growth kinetics of the crack to be controled by gas diffusion from the bulk of the hydrogel to the crack boundaries. Crack propagation continously creates fresh crack surface whose high gas concentration supports continous crack growth. The model confirms the observed linear growth of the main crack radius and predicts the growth rate with high accuracy from the material properties.
This work might be of interest as catastrophic mechanism of tissue damage for decompression sickness and to study material properties via cavitation rheology.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

https://doi.org/10.1039/D0SM01795G

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Student Poster Award

Primary authors: Mr ZHANG, Yansheng (DAMTP, University of Cambridge); ETZOLD, Merlin Aragon (DAMTP, University of Cambridge); Dr LEFAUVE, Adrien (DAMTP, Cambridge)

Presenter: Dr LEFAUVE, Adrien (DAMTP, Cambridge)

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