# Shock energy attenuation of hydrogels: experiments and modeling

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**Abstract**

It has been shown that methyl cellulose hydrogels are excellent candidates to attenuate shock energy. Methylcellulose hydrogels undergo a thermoreversible liquid to solid transition upon reaching a temperature of about 70C, while being cheap and totally innocuous health-wise, as they are routinely used in the food and pharma industries. In this presentation, we will show how we measured the frequency-dependent attenuation and implemented it in a simple 1D model. The next step was the development of a 3D model, implemented in a finite element code, which calculates the structural response for each frequency component, all being later recombined to generate the transmitted pulse. The 3D model was verified vs. the above-mentioned semi-analytical 1D model, and results of structural impact simulations will be shown that further illustrate the potential of those hydrogels to be part of a shock-mitigation assembly. This new development allows for the optimization of a gel-protective layer for any structure and type of impulsive load.

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