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INVERSE IDENTIFICATION OF BI-MATERIAL SOFT TISSUE PARAMETERS

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Keloid scars are considered to be benign tumors of the skin that can grow beyond the initial limits of a wound. The preferential appearance of keloids in certain anatomical sites and their pattern of growth attests to the influence of the mechanical stress as one of the driving factors [1]. Thus, a mechanical characterization of a keloid scar is to be done in order to better understand the keloid and, ultimately, to prevent its growth. A uniaxial tensile experiment was performed *in vivo* on a young caucasian female with a keloid scar located on the upper part of her left arm. The reaction force measurements were acquired by a force sensor in the loading cell and the surface displacement field was captured using the Digital Image Correlation technique [2]. The scared skin was modelled as a bi-material 2D-structure. The non-linear forward solver used artificially generated measurements with an additive white Gaussian noise [3]. By using the simulated data, the material parameters of the both the keloid and the healthy skin media were identified through an FEMU-based open-source framework [4, 5]. The results show that it is possible to identify accurately at least 4 material parameters from a uniaxial test. Different uncertainty analyses including noise levels and the number of snapshots have been performed to explore the computational limits of model parameter identifiability. Our next steps consist of using the real experimental data to identify the material parameters.

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