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NONLINEAR MODEL ORDER REDUCTION IN MECHANOBIOLOGICAL MODELING OF SOFT TISSUES

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ABSTRACT

Research has shown that compression and mechanical strain lead to tissue damage and can be used to evaluate injury risk. Finite element modeling has made significant progress in mechanobiological modeling. Consequently, strain mechanisms are better understood. However, more progress is needed in multiscale modeling, coupled models between organs or bones, and in digital twinning for patient specific modeling. The computational complexity of finite element models hinders progress and the incorporation of more observational data into numerical models.

This minisymposium aims to discuss recent results in model order reduction in this field, especially when strain prediction in organs belongs to a nonlinear manifold with a nonlinear latent representation.

All strategies incorporating recent algorithms related to dimensionality reduction, self-supervised learning, autoencoders, or reduced-basis dictionaries are welcome at this minisymposium.