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WYDZIAŁ MECHANICZNY TECHNOLOGICZNY

Katedra Mechaniki i Inżynierii Obliczeniowej

Rozprawa doktorska

Tytuł:

*Modelowanie wieloskalowe materiałów hipersprężystych*

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Promotor:

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## ***Multiscale modeling of hyperelastic materials***

In this dissertation, research has been conducted on the application of multiscale uncoupled modeling leveraging evolutionary algorithms to determine equivalent material parameters of hyperelastic composites. The decoupled multiscale method enabled the analysis of various model scales to be done independently. This contributed to the acceleration of the computation time of a complex structure on a micro scale. The key factor that influenced the finding of the global optimum was the use of evolutionary algorithms. The finite element method was used to solve the problems. The paper presents numerical examples for composites both with spherical inclusions and with inclusions in the form of fibers, as well as the multiscale model of the white matter of the brain, confirming the effectiveness of the developed multiscale modeling method.