

## عنوان مقاله:

Neural Networks with Input Dimensionality Reduction for Efficient Temperature Distribution Prediction in a Warm Stamping Process

## محل انتشار:

مجله مکانیک کاربردی و محاسباتی، دوره 8، شماره 4 (سال: 1401)

تعداد صفحات اصل مقاله: 14

## نویسندگان:

Chun Kit Jeffery Hou - *Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, ON, Canada*

Kamran Behdinan - *Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, ON, Canada*

## خلاصه مقاله:

Hot stamping involves deforming a heated blank to form components with increased mechanical strength. More recently, warm stamping procedures have been researched. The forming occurs at lower temperatures to improve process efficiency. The process is non-linear and inefficient to solve using finite element simulations and surrogate models. This paper presents the use of dimension-reduced neural networks (DR-NNs) for predicting temperature distribution in FEM warm stamping simulations. Dimensionality reduction methods transformed the input space, consisting of assembly, material, and thermal features, to a set of principal components used as input to the neural networks. The DR-NNs are compared against a standalone neural network and show improvements in terms of lower computational time, error, and prediction uncertainty.

## کلمات کلیدی:

machine learning, Warm Stamping, Finite element analysis, dimensionality reduction, Artificial Neural Networks

## لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1478924>

