Title (en)

SYSTEM FOR ASCERTAINING INTERNAL LOAD STATES OF A MECHANICAL COMPONENT

Title (de)

SYSTEM ZUM ERMITTELN INNERER BELASTUNGSZUSTÄNDE EINES MECHANISCHEN BAUTEILS

Title (fr)

SYSTÈME POUR DÉTERMINER DES ÉTATS DE CONTRAINTE INTERNES D'UN COMPOSANT MÉCANIQUE

Publication

EP 4320542 A1 20240214 (DE)

Application

EP 22765794 A 20220816

Priority

- DE 102021121264 A 20210816
- EP 2022072833 W 20220816

Abstract (en)

[origin: WO2023021022A1] The invention relates to a system for ascertaining internal load states of a mechanical component under the effect of external forces. The system has the following components: - an input interface which is designed to receive geometry data that represents the component, - a finite element pre-processor which is designed to divide the component into finite elements and assign at least one material property and/or at least one boundary condition to at least one element, - a finite element equation solver which is designed to provide a global stiffness matrix for the component, said global stiffness matrix indicating how the elements of the component are deformed on the basis of the assigned material property and/or boundary condition, and to identify the regions in the component in which the component is deformed and other regions in which the geometry of the component remains substantially unchanged despite the influence of external forces, and - a finite element post-processor which is designed to display the internal load state of the mechanical component under the effect of external forces. The system additionally comprises at least one trained neural network, wherein the trained neural network is trained to determine stiffness components of an element stiffness matrix from at least one finite element of the component, and the finite element is preferably located in the region of the component in which the component is deformed under the effect of external forces, thus resulting in a change in the geometry of the component. The finite element equation solver is additionally designed to use the element stiffness matrix determined by the trained neural network for the deformed element in order to update the global stiffness matrix and determine the internal load state of the mechanical component under the effect of external forces on the basis of the updated global stiffness matrix.

IPC 8 full level

G06F 30/23 (2020.01); **G06F 30/27** (2020.01); G06F 119/14 (2020.01)

CPC (source: EP)

G06F 30/23 (2020.01); **G06F 30/27** (2020.01); G06F 30/17 (2020.01); G06F 2119/14 (2020.01)

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

Designated validation state (EPC)

KH MA MD TN

DOCDB simple family (publication)

DE 102021121264 A1 20230216; EP 4320542 A1 20240214; WO 2023021022 A1 20230223

DOCDB simple family (application)

DE 102021121264 A 20210816; EP 2022072833 W 20220816; EP 22765794 A 20220816