عنوان مقاله:

A Novel Method to Obtain Material Properties through Knoop Indentation

محل انتشار:

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خلاصه مقاله:

In the current work a novel method has been suggested to attain material characterizations through Knoopindentation without any insight observations. Holloman model is supposed as material model in which yield stress andwork hardening exponent are noticeable material properties to derive. An extensive series of indentation simulationshave been performed using Abaqus Software. Also tensile test and experimental indentations have been performed toconfirm simulations. In experimental procedure LVDT (Linear Variable Differential Transformation) is employed torecord the results without any additional machine deformations. Force-Displacement curves (F-D curve) of materialsduring indentation process have been investigated thoroughly to find appropriate trends. Three distinct parameterswhich are maximum force, indentation work and concavity of loading curve have been extracted to make differentmaterials distinctive from each other. In follow an error function is constituted using summation of three fittedequations to F-D curve items. In order to achieve yield stress and work hardening exponent, an optimization processhas been performed through genetic algorithm. As can be observed there is an acceptable agreement betweenanticipated material properties with those real one. Achieved results evidently confirmed that the proposed methodworks precisely and can be used as a non-destructive method to obtain yield stress and work hardening exponent.

کلمات کلیدی:

Knoop, Indentation, Material Properties, Genetic Algorithm

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