Accepted Manuscript

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PII: S0997-7538(15)00055-8

DOI: 10.1016/j.euromechsol.2015.05.011

Reference: EJMSOL 3192

To appear in: *European Journal of Mechanics / A Solids*

Received Date: 18 December 2014

Accepted Date: 21 May 2015

Please cite this article as: Clausner, A., Richter, F., Usage of the concept of the effectively shaped indenter for the determination of yield stress from Berkovich nano-indentation experiments, *European Journal of Mechanics / A Solids* (2015), doi: 10.1016/j.euromechsol.2015.05.011.

Usage of the concept of the effectively shaped indenter for the determination of yield stress from Berkovich nano-indentation experiments.

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Abstract

Determining the yield stress Y in addition to the indentation modulus E_{IT} and hardness H_{IT} from Berkovich nano-indentation experiments would widely open up their possible uses. Because of their self-similarity there is not enough information obtainable from such experiments to characterize the complete stress-strain curve of the specimen. Nevertheless it could be shown by Schwarzer and Pharr (2004) that for some selected materials the concept of the effectively shaped indenter (CEI) seems to provide good results when used to determine the yield stress Y from Berkovich indentations. However, further research providing a more complete overview why and under which circumstances the CEI is able to give such adequate results for the yield stresses is still missing.

In this work, a wide spread database of simulated and experimental Berkovich nano-indentation force-displacement curves together with reference values for the yield stresses was utilized. Applying the CEI to these

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