

Towards an open source post-processing tool for indentation testing

Ludovic Charleux^{1(*)}, Alessandro Benedetto², Vincent Keryvin³

¹ Univ. Savoie Mont Blanc, EA 4114, SYMME, F-74000, Annecy, France

² Saint-Gobain Recherche, 39 quai Lucien Lefranc, F- 93303 Aubervilliers, France

³ Univ. Bretagne Sud, UMR CNRS 6027, IRDL, F-56100 Lorient, France

(*)email : ludovic.charleux@univ-smb.fr

ABSTRACT

Indentation testing is widely used in academic and industrial environments to measure mechanical properties on small volumes of material in a non-destructive way. The indentation machines and especially nanoindentation have known a very important development over the last 30 years. The interpretation of these tests is complex in particular because of the very strong heterogeneity of the stress field they generate. There is therefore generally obvious relation between the raw data extracted from a test and material properties.

The post-processing of a test will thus generally rely on two types of operations. In the first step, various corrections must be applied such as machine stiffness corrections, a recalibration of the contact with the sample surface or a consideration of the real shape of the tip used. In a second step, inverse methods can be applied to find the material properties. Many methods have been published. However, few of these methods have been widely adopted. This is partly due to the fact that there is no standard tool for post-processing indentation tests. There are few studies in the literature comparing the influence of the choice of the machine and especially the post-processing methods on the mechanical properties a single.

The "Indentation" community, both in France and worldwide, does not have today an open source tool to process the tests in a reproducible way and which is not linked to a given machine manufacturer. In a close community, we can cite the Gwyddion[1] tool which allows to process atomic force microscopy images and fulfills a similar role. Our project is therefore to develop a tool for processing indentation tests that is both open enough for research use but also very simple to use to help experimenters in their daily work. Our project aims at federating a community including both numericians and experimenters in order to meet the broadest spectrum of needs.

The tool will be based on Python language and will propose a graphical interface based on Jupyter framework in order to allow working with a graphical interface and command line simultaneously. It will be made available under an open source license via the GitHub versioning platform.

KEYWORDS

Indentation, post-processing, open-source

REFERENCES

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