# Article information:

On the invariance of hardness at sharp indention of materials with general biaxial residual stress fields - ScienceDirect  
<https://www.sciencedirect.com/science/article/pii/S026130691300530X>

# Article summary:

1. Residual stresses have a small influence on the observed Vickers indentation hardness of materials.

2. The change in contact area at indentation, but not material hardness, is dependent on residual stress effects on the apparent yield stress of the material.

3. The sensitivity to residual stresses of global indentation properties can be enhanced by changing the inclined angle of the sharp indenter.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article discusses the influence of residual stresses and strains on the results of sharp indentation tests. The authors provide a comprehensive review of previous studies in this area, including experimental, theoretical, and numerical investigations. They also discuss the potential applications of their findings to other mechanical problems where residual stresses can complicate the situation.

Overall, the article provides a thorough analysis of the problem and presents a range of perspectives on the issue. However, there are some potential biases and limitations that should be considered.

One potential bias is that most of the studies reviewed focus on equi-biaxial residual stress fields. While some investigations have been conducted on non-equibiaxial stress fields, these are less well understood. Therefore, it is possible that the conclusions drawn from equi-biaxial studies may not apply to all materials or situations.

Another limitation is that most of the studies reviewed focus on global indentation properties such as hardness and contact area. While these are important measures for many applications, they may not capture all aspects of material behavior under indentation. For example, local deformation patterns or crack initiation may be influenced by residual stresses in ways that are not captured by global measures.

Additionally, while the authors discuss potential applications of their findings to other mechanical problems such as scratch testing or delamination in composites, they do not provide detailed analyses or evidence for these claims. It would be helpful to see more specific examples or case studies demonstrating how their findings could be applied in practice.

Finally, while the authors present a range of perspectives on the issue, there is some promotional content towards sharp indentation testing as opposed to spherical indentation testing. While they acknowledge that spherical indentation may be more sensitive to residual stresses than sharp indentation testing, they argue that sharp indentation has advantages due to its independence from indentation depth. However, it would be helpful to see a more balanced discussion of both methods and their respective strengths and weaknesses.

In conclusion, while this article provides a comprehensive review of previous studies on residual stresses and sharp indentation testing, there are some potential biases and limitations that should be considered when interpreting its findings.

# Topics for further research:

* Non-equibiaxial residual stress fields and indentation testing
* Local deformation patterns and residual stresses in indentation
* Residual stresses and crack initiation in materials
* Applications of residual stress analysis beyond indentation testing
* Spherical indentation testing and residual stress analysis
* Comparison of sharp and spherical indentation testing for residual stress analysis

# Report location:

<https://www.fullpicture.app/item/42d87605f0e7dce803fb50b499c4cab2>