

## Accepted Manuscript

Sample size effect on the dynamic torsional behavior of the 2A12 aluminum alloy

J.H. Chen, W.F. Xu, R.Z. Xie, F.J. Zhang, W.J. Hu, X.C. Huang, G. Chen



PII: S2095-0349(17)30106-X  
DOI: <https://doi.org/10.1016/j.taml.2017.09.008>  
Reference: TAML 183

To appear in: *Theoretical & Applied Mechanics Letters*

Received date: 1 May 2017  
Revised date: 6 September 2017  
Accepted date: 13 September 2017

Please cite this article as: J.H. Chen, W.F. Xu, R.Z. Xie, F.J. Zhang, W.J. Hu, X.C. Huang, G. Chen, Sample size effect on the dynamic torsional behavior of the 2A12 aluminum alloy, *Theoretical & Applied Mechanics Letters* (2017), <https://doi.org/10.1016/j.taml.2017.09.008>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Sample size effect on the dynamic torsional behavior of the 2A12 aluminum alloy

J.H. Chen<sup>\*</sup>, W.F. Xu, R.Z. Xie, F.J. Zhang, W.J. Hu, X.C. Huang, G.Chen<sup>\*</sup>  
Institute of Systems Engineering, China Academy of Engineering Physics, Mianyang, Sichuan  
621999, China

### Abstract

In order to investigate the effect of sample size on the dynamic torsional behavior of the 2A12 aluminum alloy. In this paper, torsional split Hopkinson bar tests are conducted on this alloy with different sample dimensions. It is found that with the decreasing gauge length and thickness, the tested yield strength increases. However, the sample inner/outer diameter has little effect on the dynamic torsional behavior. Based on the finite element method, the stress states in the alloy with different sample sizes are analysed. Due to the effect of stress concentration zone (SCZ), the shorter sample has a higher yield stress. Furthermore, the stress distributes more uniformly in the thinner sample, which leads to the higher tested yield stress. According to the experimental and simulation analysis, some suggestions on choosing the sample size are given as well.

**Keywords:** Torsional split Hopkinson bar; Dynamic torsion; Sample size effect; Finite element analysis; Stress distribution

<sup>\*</sup>Corresponding authors

E-mail addresses: lxchenjh@caep.cn(J.H. Chen), [chengang@caep.cn](mailto:chengang@caep.cn)(G.Chen)

Download English Version:

<https://daneshyari.com/en/article/7196480>

Download Persian Version:

<https://daneshyari.com/article/7196480>

[Daneshyari.com](https://daneshyari.com)