

Accepted Manuscript

Title: Measurement of abrasive particle velocity and size distribution in high pressure abrasive slurry and water micro-jets using a modified dual disc anemometer

Authors: Naser Haghbin, Ariana Khakpour, Jeff Schwartzentruber, Marcello Papini



PII: S0924-0136(18)30348-0
DOI: <https://doi.org/10.1016/j.jmatprotec.2018.08.014>
Reference: PROTEC 15879

To appear in: *Journal of Materials Processing Technology*

Received date: 9-1-2018
Revised date: 3-8-2018
Accepted date: 11-8-2018

Please cite this article as: Haghbin N, Khakpour A, Schwartzentruber J, Papini M, Measurement of abrasive particle velocity and size distribution in high pressure abrasive slurry and water micro-jets using a modified dual disc anemometer, *Journal of Materials Processing Tech.* (2018), <https://doi.org/10.1016/j.jmatprotec.2018.08.014>

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.

Measurement of abrasive particle velocity and size distribution in high pressure abrasive slurry and water micro-jets using a modified dual disc anemometer

Naser Haghbin^{b,a,1}, Ariana Khakpour^{a,1}, Jeff Schwartzentruber^a, Marcello Papini^{a,*}

^a*Department of Mechanical and Industrial Engineering, Ryerson University, 350 Victoria Street, Toronto, ON, Canada M5B 2K*

^b*Department of Mechanical Engineering Technology, SUNY Polytechnic Institute, 100 Seymour Road, Utica, NY, USA 13502*

¹*The first two authors contributed equally to this paper.*

^{*}**Corresponding author** Tel: +1 416 979 5000, X7655; fax: +1 416 979 5265. Email address: mpapini@ryerson.ca

Abstract

In both abrasive water jet (AWJ) and high pressure abrasive slurry jet (HASJ) machining, garnet abrasive particles are mixed with water and the resulting jet can contain particles travelling with a wide range of velocities. Previous investigations have suggested that a dual disc anemometer (DDA) can be used to provide an assessment of the average particle velocity within the jets. This paper presents an in-depth analysis of the DDA test by considering the distribution and size of impact craters on the recording disc, and by modeling the size of the slurry slug incident to it. Procedures are presented to assess the accuracy of the determined average velocity, and to determine the histogram of particle velocities within the jet. A modification to the anemometer is introduced which also allows determination of the particle size-velocity correlation. Results are presented for both HASJ and AWJ under typical process conditions, and compared to existing analytical models of abrasive particle velocity from the literature, with good agreement.

Keywords: abrasive particle velocity, dual disc anemometer, micro-machining, abrasive water jet, abrasive slurry jet

Download English Version:

<https://daneshyari.com/en/article/11004013>

Download Persian Version:

<https://daneshyari.com/article/11004013>

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