Announcement of B. John Davies Prize for the best paper published in IJAMT in 2017

Anthony Doyle¹ · Andrew Y. C. Nee²

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The B. John Davies Prize for the best paper published in IJAMT 2017 has been awarded to Jiang-qin Ge, Shi-ming Ji, and Da-peng Tan. The prize recognizes exceptional articles published in IJAMT, and awards authors for making an especially significant contribution. The award was named after the late B. John Davies of the University of Manchester Institute of Science and Technology (UMIST), the founding editor-in-chief of IJAMT who led the journal from its launch in 1985 until 2013.

Process

From all the papers received and published in 2017, five highly rated papers with recommendations by two or more reviewers for the B. John Davies Prize were shortlisted. The shortlisted papers were carefully scrutinized by the regional editors. The following paper¹ has received the highest vote and has been awarded the 2017 prize.

Title of paper

A gas-liquid-solid three-phase abrasive flow processing method based on bubble collapsing
(The International Journal of Advanced Manufacturing Technology, 2018, Volume 95, Number 1–4, Page 1069)

Authors

Jiang-qin Ge 1, Shi-ming Ji 1, Da-peng Tan 1, 2

¹ Ge, J., Ji, S. & Tan, D. Int J Adv Manuf Technol (2018) 95: 1069. <https://doi.org/10.1007/s00170-017-1250-9>

✉ Anthony Doyle
anthony.doyle@springer.com

Andrew Y. C. Nee
mpeneeyc@nus.edu.sg

¹ Springer, The Campus, 4 Crinan St, London N1 9XW, UK

² National University of Singapore, Department of Mechanical Engineering, 9 Engineering Drive 1, Singapore 117576, Singapore

Author affiliations

1. Key Laboratory of E&M, Ministry of Education & Zhejiang Province, Zhejiang University of Technology, Hangzhou 310014, China; E-mail: tandapeng@zjut.edu.cn; Tel/Fax: +86-571-88871052

2. State Key Laboratory of Digital Manufacturing Equipment & Technology, Wuhan 430074, China

Abstract

Soft abrasive flow (SAF) processing presents advantages in avoiding surface damages and adapting complex workpiece shapes. However, the current SAF method exhibits low processing efficiency for hard-brittle materials. To solve this problem, a gas-liquid-solid three-phase abrasive flow processing method (GLSP) based on bubble collapsing is proposed. Through a surface constrained module, a multi-inlet constrained flow passage for silicon wafer processing is constructed, in which the bubbles are injected into the abrasive flow to strengthen the processing efficiency. On the basis of the Euler multi-phase model and population balance model (PBM), a GLSP fluid mechanic model is set up. Simulation results show that the bubble collapse region can be controlled by designing the flow passage structure, and that the near-wall particle turbulent motion can be strengthened by decreasing the fluid viscosity. The observation and processing experiments show that the most violent bubble collapsing occurs in the initial constrained surface region; Bubble collapsing can result in an average particle velocity increase from 12.90 m/s to 15.97 m/s; the proposed GLSP method can increase the processing efficiency by 50% compared with the SAF method, and the average surface roughness can reach 2.84 nm.

Anthony Doyle
Executive Editor, Springer

Andrew Y C Nee
Editor-in-Chief

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