

Accepted Manuscript

Title: Non-contact piezoelectric rotary motor modulated by giant electrorheological fluid

Author: Wei Qiu Yaying Hong Yosuke Mizuno Weijia Wen
Kentaro Nakamura



PII: S0924-4247(14)00262-3
DOI: <http://dx.doi.org/doi:10.1016/j.sna.2014.05.019>
Reference: SNA 8806

To appear in: *Sensors and Actuators A*

Received date: 3-2-2014
Revised date: 21-4-2014
Accepted date: 18-5-2014

Please cite this article as: W. Qiu, Y. Hong, Y. Mizuno, W. Wen, K. Nakamura, Non-contact piezoelectric rotary motor modulated by giant electrorheological fluid, *Sensors and Actuators: A Physical* (2014), <http://dx.doi.org/10.1016/j.sna.2014.05.019>

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Non-contact piezoelectric rotary motor modulated by giant electrorheological fluid

Wei Qiu,¹*Yaying Hong,²Yosuke Mizuno,¹

Weijia Wen,² and Kentaro Nakamura¹

¹Precision and Intelligence Laboratory, Tokyo Institute of Technology,

4259 Nagatsuta-cho, Midori-ku, Yokohama 226-8503, Japan

²Department of Physics, Hong Kong University of Science and Technology,

Clear Water Bay, Kowloon, Hong Kong, China

*Corresponding author. Tel.: +81-45-924-5052; fax: +81-45-924-5091.

E-mail addresses: qiu@sonic.pi.titech.ac.jp

highlights

- Giant electrorheological (GER) fluid is utilized to non-contact piezoelectric motors.
- Motor performance is ideal under 2 kV/mm electric field strength with 30% duty cycle.
- Offering force much larger than that of conventional non-contact ultrasonic motors.

Abstract: A bidirectional non-contact rotary motor using a piezoelectric torsional vibrator and the giant electrorheological (GER) fluid is described in this paper. By applying the dynamic electric signal with a square waveform to the GER fluid, which is in phase with the vibration velocity of the torsional vibrator, bidirectional rotation at an excitation frequency of 118 Hz is achieved. This motor generates 1.04 mNm torque when the electric field strength of 2 kV/mm with 30% duty cycle is applied to the GER fluid, and the rotational speed of up to 7.14 rad/s is achieved if the electric field strength is increased to 2.5 kV/mm. Similarities and differences of the motor

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