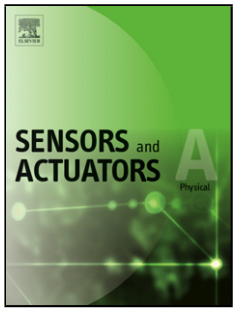

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Non-contact piezoelectric rotary motor modulated by giant electrorheological fluid

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highlights

- Giant electrorheological (GER) fluid is utilized to non-contact piezoelectric motors.
- Motor performance isideal 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 usinga piezoelectric torsional vibratorandthe giantelectrorheological(GER) fluidis 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 1.04mNm torque when the electric field strength of 2 kV/mm with 30% duty cycle is applied to the GER fluid, andthe rotational speed of up to 7.14 rad/sis achieved ifthe electric field strength is increased to2.5 kV/mm.Similarities and differences of the motor