

# **13th International Conference on Electrorheological Fluids and Magnetorheological Suspensions**

**(ERM2012)**

**Journal of Physics: Conference Series Volume 412**

**Ankara, Turkey  
2-6 July 2012**

**ISBN: 978-1-62276-990-2  
ISSN: 1742-6588**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2012) by the Institute of Physics  
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact the Institute of Physics  
at the address below.

Institute of Physics  
Dirac House, Temple Back  
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481  
Fax: 44 1 17 920 0979

[techtracking@iop.org](mailto:techtracking@iop.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## ELECTRORHEOLOGICAL MATERIALS

<b>012001 Preparation, Microstructure and Electrorheological Activity of Nanosized Modified Titanium Dioxide and Titaniferous Fillers</b> .....	1
<i>E V Korobko, Z A Novikova, M A Zhuravski, A N Murashkevich, O A Alisienok</i>	
<b>012002 Electrorheological Behaviour Under Oscillatory Shear of TiO<sub>2</sub> Rod-like Particles Prepared Via Microwave-assisted Molten-salt Synthesis</b> .....	5
<i>M Sedlacik, M Mrlik, V Pavlinek, Z Kozakova, P Saha</i>	
<b>012003 Synthesis and Electrorheological Effect of Cr Doped TiO<sub>2</sub> Nanorods with Nanocavities in Silicone Oil Suspensions</b> .....	13
<i>S Almajdalawi, V Pavlinek, M Mrlik, Q Cheng, M Sedlacik</i>	
<b>012004 Solvothermal Synthesis of Different TiO<sub>2</sub> Morphology and Their Electrorheological Characteristics</b> .....	19
<i>S Almajdalawi, V Pavlinek, M Mrlik, Q Cheng, P Piyamanocha, M Pastorek, M Stenicka</i>	
<b>012005 Electrorheological Response of Polyindene/colemanite Conducting Composite</b> .....	25
<i>H I Unal, B Cetin, O Erol</i>	
<b>012006 Viscoelastic Properties of Electrorheological Suspensions of Core-shell (Carbon/Polyaniline) Particles in Silicone Oil</b> .....	32
<i>M Sedlacik, S Almajdalawi, M Mrlik, V Pavlinek, P Saha, J Stejskal</i>	
<b>012007 Electrorheology of Aniline-oligomer Suspensions Under Oscillatory Shear</b> .....	40
<i>M Mrlik, V Pavlinek, S Almajdalawi, P Saha, P Bober, J Stejskal</i>	
<b>012008 Microconvection Heat Transfer in Electrorheological Fluids in Rotating Electric Field</b> .....	46
<i>A A Mokeev, S A Gubarev, E V Korobko, N A Bedik</i>	
<b>012009 Response Time of an ER-fluid Under Shear and Flow Modes</b> .....	58
<i>B Abu-Jdayil</i>	
<b>012010 On the Comparison of Electrorheological Measurements with Different Generation of an Electric Field</b> .....	66
<i>P Peer, M Stenicka, P Filip, V Pavlinek</i>	
<b>012011 Efforts to Establish Standardized Methods to Characterize Electrorheological Suspensions – An Interim Report Focusing on Flow Mode Characterization</b> .....	74
<i>S Schneider, K Holzmann, S Ulrich</i>	
<b>012012 Development of a Manipulator with an Opposed-placement-type ER Clutch Contributing to Collision Force Reduction</b> .....	82
<i>A Inoue, N Kanno, M Yoshikawa, T Nakamura</i>	
<b>012013 Temperature and Shear Rate Characteristics of Electrorheological Gel Applied to a Clutch</b> .....	90
<i>K Koyanagi, Y Takata, Y Kakinuma, H Anzai, K Sakurai, T Motoyoshi, T Oshima</i>	
<b>012014 Dynamic Model of the Electrorheological Fluid Based on Measurement Results</b> .....	99
<i>K Krivenkov, S Ulrich, R Bruns</i>	
<b>012015 Elastoviscoplastic Behavior Model of Electrorheological Fluids in Various Deformation Modes</b> .....	106
<i>E V Korobko, M A Zhuravski, A A Makhaniok</i>	

## MAGNETORHEOLOGICAL MATERIALS

<b>012016 Magnetorheology of Carbonyl Iron Particles Coated with Polypyrrole Ribbons: the Steady Shear Study</b> .....	113
<i>M Mrlik, M Sedlacik, V Pavlinek, P Peer, P Filip, P Saha</i>	
<b>012017 Temperature Induced Effects on the Durability of MR Fluids</b> .....	120
<i>A Wiehe, C Kieburg, J Maas</i>	
<b>012018 Effect of an Applied Magnetic Field on Sloshing Pressure in a Magnetic Fluid</b> .....	131
<i>S Kaneko, T Ishiyama, T Sawada</i>	
<b>012019 Investigation of Cluster Growth in MR Fluids Using Ultrasonic Wave Propagation</b> .....	138
<i>A Isnikurniawan, J Kuroiwa, S Abell, T Sawada</i>	
<b>012020 MRF in a Plate-plate Magnetorheometer: Numerical Insight Into the Particle-wall Interface</b> .....	143
<i>H G Lager, C Bierwisch, M Moseler</i>	

<b>012021 Adhesion Peculiarities at the Contact of MRF with Solid State in Gradient Magnetic Field</b> .....	150
<i>V A Kuzmin, E V Korobko, V P Roizman, Z A Novikova, A P Dostanko, A O Karabko</i>	
<b>012022 Preliminary Investigation of Magneto-rheological Fluid Durability in Continuous Slippage Clutch</b> .....	158
<i>J-F Desrosiers, J-P Lucking Bigué, M Demninger, G Julió, J-S Plante, F Charron</i>	
<b>012023 Resistance of a Commercial Magnetorheological Fluid to Penetration</b> .....	170
<i>K F Plunkett, M A Imam, B Rath, H Conrad</i>	
<b>012024 The Behavior of the MR Fluid During Durability Test</b> .....	180
<i>J Roupec, I Mazurek, Z Strecker, M Klapka</i>	
<b>012025 Variation of Forced Convective Heat Transfer in Rectangular Duct Flow of a Magnetic Fluid Under Magnetic Field</b> .....	188
<i>M Motozawa, T Sekine, T Sawada, Y Kawaguchi</i>	
<b>012026 Visualization on the Behavior of Nanoparticles in Magnetic Fluids Under the Electric Field</b> .....	199
<i>W-H Lee, J-C Lee</i>	
<b>012027 a Comparison Between Micro- and Macro-structure of Magnetoactive Composites</b> .....	204
<i>T Gundermann, S Günther, D Borin, S Odenbach</i>	
<b>012028 Derivation of Stiffness Matrix in Constitutive Modeling of Magnetorheological Elastomer</b> .....	210
<i>D Leng, L Sun, J Sun, Y Lin</i>	
<b>012029 Energy Dissipation Characteristics of Magnetoactive Elastomer Under Impact Loading</b> .....	219
<i>D Leng, L Sun, J Sun, W Chen, F Ma, W Li, Y Lin</i>	
<b>012030 Experimental and Numerical Investigation on Damping Properties and Energy Dissipation Mechanisms of Magnetoactive Rubber</b> .....	229
<i>W Li, L Sun, J Sun, W Chen, F Ma, D Leng</i>	
<b>012031 Magnetodeformational Effect of the Magnetoactive Elastomer and Its Possible Applications</b> .....	238
<i>G V Stepanov, E Yu Kramarenko, D A Semerenko</i>	
<b>012032 Magnetorheological Elastomer and Its Application on Impact Buffer</b> .....	242
<i>J Fu, M Yu, X M Dong, L X Zhu</i>	
<b>012033 on the Magnetic Field and Temperature Monitoring of a Solenoid Coil for a Novel Magnetorheological Elastomer Base Isolator</b> .....	252
<i>Y Li, J Li, B Samali</i>	
<b>012034 On the Mobility of Iron Particles Embedded in Elastomeric Silicone Matrix</b> .....	259
<i>R Rabindranath, H Böse</i>	
<b>012035 Predicating Magnetorheological Effect of Magnetorheological Elastomers Under Normal Pressure</b> .....	266
<i>X Dong, N Ma, J Ou, M Qi</i>	
<b>012036 Prototype of Haptic Device for Sole of Foot Using Magnetic Field Sensitive Elastomer</b> .....	272
<i>T Kikuchi, Y Masuda, M Sugiyama, T Mitsumata, S Otori</i>	
<b>012037 Study of Magnetorheology and Sensing Capabilities of MR Elastomers</b> .....	278
<i>T F Tian, W H Li, G Alici</i>	
<b>012038 Study of PDMS based Magnetorheological Elastomers</b> .....	288
<i>T F Tian, X Z Zhang, W H Li, G Alici, J Ding</i>	
<b>012039 Study on the Properties of Porous Magnetorheological Elastomers Under Shock Effect</b> .....	296
<i>B X Ju, M Yu, J Fu, X Zheng, Q Yang</i>	
<b>012040 Tuning the Tensile Modulus of Magnetorheological Elastomers with Magnetically Hard Powder</b> .....	305
<i>D Yu Borin, G V Stepanov, S Odenbach</i>	
<b>012041 Control of Haptic Master – Slave Robot System for Minimally Invasive Surgery (MIS)</b> .....	310
<i>J S Oh, W K Shin, C H Uhm, S R Lee, Y M Han, S B Choi</i>	
<b>012042 Control Performance Evaluation of Railway Vehicle MR Suspension Using Fuzzy Sky-ground Hook Control Algorithm</b> .....	317
<i>S H Ha, S B Choi, G S Lee, W H Yoo</i>	
<b>012043 Control System with Magnetorheological Fluid Device for Mitigation of the Railway Vehicle Hunting Oscillations</b> .....	322
<i>D Baiasu, G Ghita, I Sebesan</i>	
<b>012044 Damping Force Control of Frictionless MR Damper Associated with Hysteresis Modeling</b> .....	339
<i>M S Seong, S B Choi, C H Kim</i>	
<b>012045 Design of a Squeeze Film Magnetorheological Brake Considering Compression Enhanced Shear Yield Stress of Magnetorheological Fluid</b> .....	346
<i>C Sarkar, H Hirani</i>	
<b>012046 Design of Shear Gaps for High-speed and High-load MRF Brakes and Clutches</b> .....	358
<i>D Güth, A Wiebe, J Maas</i>	

<b>012047 Design of Tactile Device for Medical Application Using Magnetorheological Fluid .....</b>	<b>372</b>
<i>J S Oh, J K Kim, S R Lee, S B Choi, B K Song</i>	
<b>012048 Development of 1-DOF Manipulator with Variable Rheological Joint for Instantaneous Force.....</b>	<b>378</b>
<i>T Majima, S Nagai, H Tomori, T Nakamura</i>	
<b>012049 Experimental Study on Damping Characteristics of the Tuned Liquid Column Damper with Magnetic Fluid .....</b>	<b>384</b>
<i>H Masuda, T Oyamada, T Sawada</i>	
<b>012050 Magnetorheological Torque Transmission Devices with Permanent Magnets .....</b>	<b>393</b>
<i>H Böse, T Gerlach, J Ehrlich</i>	
<b>012051 The Novel MRF-ball-clutch Design – A MRF-safety-clutch for High Torque Applications .....</b>	<b>404</b>
<i>M Jackel, J Kloepfer, M Matthias, B Seipel</i>	
<b>012052 Unsteady Flow Damping Force Prediction of MR Dampers Subjected to Sinusoidal Loading .....</b>	<b>412</b>
<i>M Yu, S Q Wang, J Fu, Y X Peng</i>	
<b>012053 Vibration Control of an Artificial Muscle Manipulator with a Magnetorheological Fluid Brake.....</b>	<b>420</b>
<i>H Tomori, Y Midorikawa, T Nakamura</i>	
<b>012054 Semi-active Control of Seat Suspension with MR Damper .....</b>	<b>430</b>
<i>H J Yao, J Fu, M Yu, Y X Peng</i>	
<b>012055 Experimental and Numerical Determination of the Static Critical Pressure in Ferrofluid Seals .....</b>	<b>445</b>
<i>W Horak, M Szczech</i>	
<b>012056 Brownian Dynamic Simulations and Experiments of MR Fluids .....</b>	<b>451</b>
<i>J P Segovia-Gutiérrez, J De Vicente, R Hidalgo-Alvarez, A M Puertas</i>	
<b>012057 Continuous Media Theory for MR Fluids in Non-shearing Flows .....</b>	<b>456</b>
<i>J A Ruiz-López, R Hidalgo-Alvarez, J De Vicente</i>	
<b>012058 Formation of a Layer of Magnetorheological Fluid on the Surface of the Moving Object in the Gradient Magnetic Field .....</b>	<b>461</b>
<i>A M Rusetski, A A Mokeev, E V Korobko</i>	
<b>Author Index</b>	