

## Advances in piezoelectric and power-ultrasonic technology at Leibniz Universität Hannover

The Piezoelectric and Ultrasonic Technology Lab of the Institute of Dynamics and Vibration Research at the Leibniz Universität Hannover works on power ultrasonic systems for actuation between 20 kHz to 100 kHz and ultrasonic systems from the power plug to the process, both theoretically and experimentally. The lab currently focuses on four research areas. One group, focused on ultrasonic wave propagation in solids and fluids, covers topics that include ultrasonic-assisted casting and laser welding, as well as the characterization of wave fields for sensing applications. A second group studies the area of electromechanically coupled structural dynamics covering the optimization and evaluation of complex transducer structures and systems under various time-dependent boundary conditions. Additionally, this group investigates broadband vibration energy-harvesting techniques. The third group focuses on the control of dynamic systems and has developed and implemented a  $\mu\text{C}$ -based standalone control and measurement unit capable of measuring unstable branches in the frequency response of non-linear transducers. The fourth group works on various interface and vibro-impact processes, including ultrasonic transportation and drives, interface processes in ultrasonic wire bonding, and a novel tactile display providing a tactile impression of virtual surfaces.



### ABOUT THE SPEAKER

Jens Twiefel  
Professor of Mechanical Engineering

Jens Twiefel obtained his diploma in computer engineering with a major in mechanical engineering from the Universität Paderborn. He earned a doctorate from Leibniz Universität Hannover, where he studied piezoelectric standing-wave motors. He has been a visiting scholar at Virginia Tech and a visiting researcher at The Tokyo University.

Since 2008, he has led the Piezoelectric and Ultrasonic Technology Lab of the Institute of Dynamics and Vibration Research at the Leibniz Universität Hannover. The group covers a variety of topics in the fields of power ultrasonics, non-linear vibration, vibration energy harvesting, wave propagation, and control of dynamic systems.

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