T-FLEX: FULLY FLEXURE-BASED PRECISION HEXAPOD

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A fully flexure-based hexapod was developed. The use of flexures allows high repeatability without backlash, hysteresis, wear and contamination. The parallel kinematic structure allows high precision and high acceleration. Direct drive iron-core motors are back-drivable and allow high accelerations while avoiding backlash and contamination. Adaptive model-based feedforward control allows high-precision motion and interaction control.

The design results in a unique combination of specifications
- 6 DoF motion
- Translational workspace of 5.5 dm^3
- Individual travel range of ± 100 mm translation and ± 10 deg rotation
- Linear accelerations up to 180 m/s^2 and velocities up to 4 m/s
- Vertical payload 20 kg
- Position repeatability 0.35 µm
- Dynamic tracking accuracy of 5 µm
- Torque sensitivity 0.1 N