INNOVATION PARTNERSHIPS
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Fabrication and Assembly of novel flexure mechanism based XY motion system

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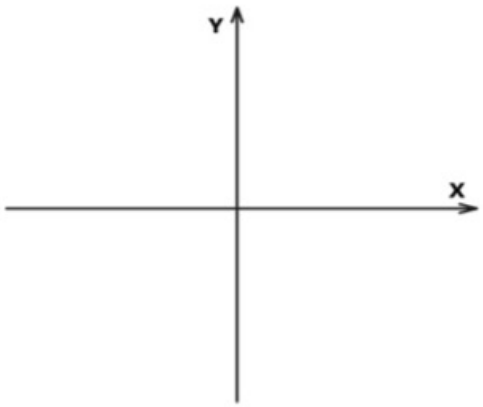

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OVERVIEW

Novel spatial parallel kinematic flexure mechanism with two degrees of freedom

- Enhanced precision and stability over existing flexure mechanisms
- Useful in micro-manufacturing, robotics, aerospace engineering, precision instrumentation

BACKGROUND

Flexure mechanisms have long been used in applications requiring precise, limited movement due to their lack of friction and backlash. Historically, such mechanisms were designed with multiple components that had to be meticulously aligned and assembled. Traditional approaches often struggled with maintaining high stiffness and minimizing error motions, primarily due to the complex assembly and misalignment issues. These limitations restricted their performance, particularly in applications demanding high precision and stability. Existing technologies frequently failed to achieve the necessary balance between flexibility in certain directions and rigidity in load-bearing directions. An improved method is critically needed to achieve superior motion control and stiffness, thereby advancing the capabilities of precision tools and devices across various high-tech industries.

INNOVATION

Researchers have created a method for fabricating and assembling a spatial parallel kinematic flexure mechanism, comprising a Sandwich module, Interconnect bars, Interconnect plates, and a Motion stage. The Sandwich module, a monolithic body with integrated flexible and rigid elements, facilitates motion in the X and Y directions while restricting movement in the Z, Qx, Qy, and Qz directions. The rigid Interconnect bars and plates further stabilize the device by constraining all six degrees of motion between the intermediate stages. This design significantly enhances performance, offering unparalleled precision and stiffness. Real-world applications of this innovation span micro-manufacturing, robotics, aerospace engineering, and precision instrumentation, where high accuracy and load-bearing capacity are crucial.

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