

Influence of a high dynamic dual-drive gantry stage mechanical coupling on its performances

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Abstract: This paper presents a physical dynamic modelling of a dual-drive gantry stage which takes into account the rigid body motion and the first flexion mode. It is used to study the influence of the mechanical coupling between the two parallel axes on the global positioning performances. Indeed, dual-drive mechanisms are commonly controlled with two independent and symmetrical position controllers while the mechanical structure is not symmetrical. This control strategy leads to an imperfect synchronism between the two axes and the mechanical coupling is submitted to huge levels of strain. In this paper, the influence of the stiffness of the joints and of the mass distribution is particularly discussed.

Keywords: Dual-drive gantry robot, Mechatronics, Physical modelling, Mechanical design.

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