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Experimental characterization of rail-to-carriage dynamic stiffness in linear guides

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Linear guides are common components in precision motion systems, and their stiffness significantly influences the eigenfrequencies of structures used in synchrotron research. However, no generally accepted or validated guideline exists for including them in finite element models. This study employs an indirect method to experimentally determine their dynamic stiffness, avoiding the complications associated with direct measurement of high-rigidity components. Simple structures with well-known dynamic behavior are connected to a linear guide, and frequency response measurements are performed to determine frequency-dependent stiffness and damping factors. Further conclusions are drawn regarding the stiffness values provided in vendor catalogues, offering practical guidance for the design of synchrotron equipment.

Footnotes

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Author: FELCSUTI, Gabor (MAX IV Laboratory)

Presenter: FELCSUTI, Gabor (MAX IV Laboratory)

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