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Thu-Mo-Po4.13-09 [104]: Levitation and guidance force for the system of coated conductor stacks and permanent magnets in a wide temperature range.

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In order to develop levitated transportation systems based on coated conductors tapes, it is important to know not only the information on the levitation force at vertical displacement, but also the data on the stability of the system at lateral displacements of the superconductor with respect to permanent magnets. Data on the lateral stability of stacks of CC-tapes above the magnetic rail can also provide important information on the axial stability of magnetic bearings based on superconducting tapes.
In this paper, we present new experimental results on the investigation of levitation force and the lateral restoring force of CC-tape stacks, which are subject to cyclic lateral displacements relative to the initial position above permanent magnet assemblies in a wide temperature range from 30 K to 80K. For the measurements, we used a commercially available 12 mm wide CC-tape, produced by SuperOx. The long tape was cut into 12 x 12 mm pieces, which were then stacked. The total number of tape pieces in the stack N ranged from 5 to 100. We measured the dependence of the levitation forces and the restoring force on the displacement for various numbers N at different temperatures. The effect of temperature on the change in levitation force and the restoring force after cyclic lateral displacements was also studied. We have found that the forces tend to decrease as the number of periodic cycles of displacement increases. It was observed that the rate of reduction of forces depends on temperature. In addition, we made a comparison with the data of experimental measurements of the axial force of a superconducting bearing based on CC-tapes.
The data obtained may be useful in the development of bearings and transport systems based on magnetic levitation. The experimental results are in good agreement with theoretical calculations of the lateral force.

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