

SUPSI

REGAX

Adaptive control for a compact synchronous linear motor

The problem

The objective of the project is to improve the performance of the permanent magnet linear motors for the company Jenny Science AG. The principal characteristics of this electrical motor types are the elevated dynamics and the high positioning precision. The control stability is influenced by external factors like total mass, frictions and electrical motor parameters, therefore the accurate modeling and identification of the process are necessary in order to achieve the requirements for the micro positioning.

The project

To improve the quality of the trajectory tracking, especially for scanning applica-

tions at very low speeds, new control algorithms and signal processing methods based on accelerometer measures have been studied, with the aim to improve the control quality maintaining low development costs. Furthermore, in order to simplify additionally the commissioning of the motors, auto-tuning methods have been researched, for the minimization of the position error during the trajectory tracking at high dynamics.

Results

The new control concept with including a low cost accelerometer could reach the required performances, reducing in particular the speed jittering by 5 times, allowing precise scanning applications without the

need to use expensive sensors. The auto tuning method is able in the one hand to calculate online the optimal control parameters and in the other hand to identify and suppress mechanical resonances.

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