

Announcement for Master Thesis / Research project

Flex Spline Modeling for Strain Wave Gears using Discrete Spring-Mass-Damper Networks

Motivation

Strain wave gears, also known as harmonic drive gears, are often used in robot joints due to their compact design and high gear ratio at the same time. While running, the flex spline (see Figure 1) is deformed elastically. For long operating times, the flex spline shows wear and often is the reason for failure of the gear. On the other hand, information about the acting torque can be derived from its deformation. Therefore, a close investigation of the deformation of the flex spline is mandatory when studying the behavior of strain wave gears. A promising and flexible approach in this regard is to model the flex spline as a discrete spring-mass-damper network.

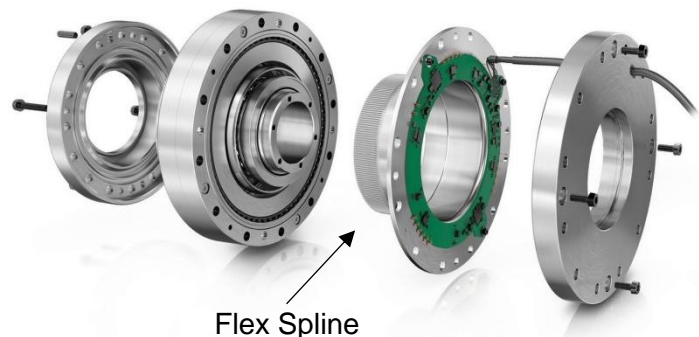


Figure 1: Source: <https://www.schaeffler.de> (modified).

Task description

In the beginning, a literature research shall be carried out. Subsequently, the network model shall be implemented and different studies on grid architectures, grid refinement, elastic properties, etc. shall be performed. Finally, a special focus is laid on optimization methods that can be applied to identify unknown network parameters.

Requirements

Programming skills, basic knowledge of MATLAB and mechanical understanding is required.

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