

3D multi-physical modeling of a Bogie

Description

More and more kinematic and structural modelling is needed in order to support mechatronics system architecture and design validation. The use of simulation tools supporting this activity is imposing itself because of complexity.

The subject of this thesis is to derive an initial 3D multi-physical model of a Bogie. This simulation tool will bring insight w.r.t the effect that certain defects have on the on the vibration signature of the train bogie parts. Such defects can be for instance related to roundness issues, track problems, track parallelism.

Although the model will be purely mechanical, an emphasis will be put on the multi-physical aspect of it. This would allow us to add more complexity to the model in the future (not in the scope of this topic), such as thermal, chemical, electrical etc..

The goal of the student will be organized as follow:

- * Literature study on bogie multi-physical modelling
- * Implementation of a simple 1D model
- * Implementation of the 3D model
- * Calibration of the 3D model throughout real datasets
- * Simulation of specific scenarios (wheel flat, bogie hunting, track groove)

Required knowledge:

- * Physics (basics of mechanics, conservative law of mass, energy and momentum...)
- * Basis of simulation (notion of causality, numerical simulation ..)
- * Differential calculus and integral
- * Programming language and Modelling software (Matlab and/or 20sim and/or Modelica)

If you are interested in this topic, please also register this on the Televic website at:

<https://www.televic.com/en/careers/internships-and-students> so we can confirm the topic is still available.

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With over 30 years of experience in designing, manufacturing and maintaining on-board communication and control systems, Televic Rail is a leading, trusted partner for railway operators and train builders worldwide.

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Contact

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Nature of the work

Level	Specialty	Type of work.	Location	Type of activities	Num of students
Academic Master, Master	Electronics / Hardware, Mechanical / Product design, Software	Research: 50% Implem.: 30% Experim.: 20%	Televic, University	Experimenting, Implementation, Literature study, Simulation	1