

Modeling of Torque Vectoring Drives for Electric Vehicles: a Case Study

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This paper shows some aspects of the implementation of a gear model with losses, nonlinear elasticity and forcing errors in the Modelica language utilizing concept of replaceable functions. Using such gear model for a torque vectoring drive modeling, a case study about a powertrain dynamic behavior in a simplified vehicle model is carried out. The total vehicle model is analyzed in several detail stages of the powertrain reaching from a fixed efficiency with constant spring stiffness to a model using nonlinear losses and nonlinear tooth stiffness. Subsequently, the simulation results of such levels of modeling detail proving tendency to drive line oscillation are presented and discussed.

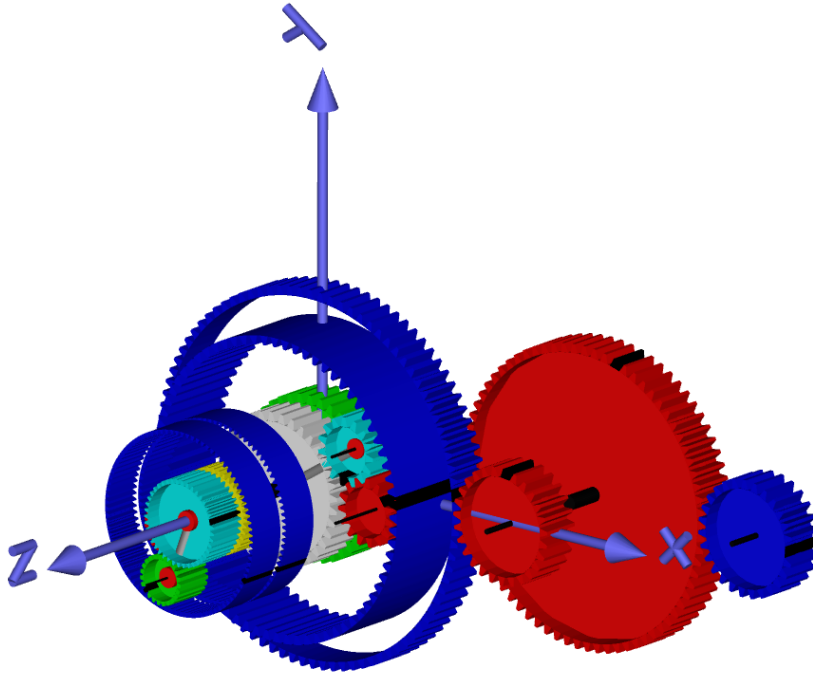


Figure 1. Torque vectoring drive consisting of a differential, superimposing unit and spur gear train. Note that only single planets are shown for simplification of the calculations.