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ON THE INTERFACE COUPLING OF DYNAMIC TREAD PATTERN WITH STATIONARY ROLLING TIRE STRUCTURE

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The simulation of tires are mostly done in Arbitrary Lagrangian Eulerian framework because of the two main features, namely the local mesh refinement at the contact area and the steady state formulation. The major disadvantage is that the detailed tread pattern would be omitted because of the axi symmetric constraint of ALE formulation. The important feature is the tread pattern which is in direct interaction with the road and this is often simulated separately or by a global - local approach because of huge number of degrees of freedom. Such kind of simulation cannot give the overall prediction of tires accurately as there is no feedback to the tire structure.

In this work, a novel approach for tires with detailed tread pattern has been carried out using coupled ALE-Lagrangian framework. The tire structure is defined in ALE stationary rolling and the tread pattern is defined in transient Lagrangian which is coupled to the material points movement in ALE tire structure. The dynamic tread pattern interaction with the road will be transferred to the tire structure such that the two way coupling is established. To verify this coupling framework numerically, the coupled two ring model (outer ring in transient Lagrangian and the inner ring in ALE steady state) results are compared to fully ALE ring model which shows satisfactory results. The next step is to compare the computational effort between the coupled framework and fully Lagrangian simulation. Results from both studies will be shown.

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