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MODELING AND VALIDATION OF AN ELASTOPLASTIC TERRAIN MODEL FOR SIMULATION OF FOREST MACHINES

John Nordberg[1], Martin Servin[2] and Urban Bergsten[3]

[1] Umeå University, SE-90187 Umeå, SWEDEN, john.nordberg@physics.umu.se, www.umu.se
[2] Umeå University, SE-90187 Umeå, SWEDEN, martin.servin@physics, www.umu.se
[3] Swedish University of Agriculture, SE-90183 Umeå, SWEDEN, urban.bergsten@slu.se, www.slu.se

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A framework for non-smooth multidomain mechanics [1] is applied to develop real time interactive simulation of a forest machine. These are used for exploration and evaluation of new designs of machines, tools and work methods in forestry with the possibility to measure productivity [2], fuel economy, ground damages and mobility [3].

The framework has recently been extended to include dynamical terrain, modeled as an elastoplastic solid using particle based discretization similar to [4] [5]. A capped plasticity model [6] [5] is employed to include the effects of soil compaction in the terrain.

In the present study we describe a mapping of existing terrain measurements [7] [8] [9] to the developed elastoplastic terrain model and numerical scheme. We also propose test system and procedures for parameter identification and for validation. The test systems include simple plate or cone tests as well as full vehicles equipped with industry standard wheels and tracked bogies. Finally, we present preliminary results from simulations of forestry machines with different type of tracked bogies.

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