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# Predicting the behaviour of woody biomass particles using deep hidden physics based models.

**Fateme Darlik[1], and Bernhard Peters[2]**

[1] University of luxembourg, Fateme.darlik@uni.lu
[2] University of luxembourg, Bernhard.peters@uni.lu

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Woody biomass energy is a kind of renewable energy that contributes to the reduction of greenhouse gas emissions, the creation of healthier forests, and the reduction of wildfire danger.
Simulations of biomass combustion, in general, are time-consuming simulations with a large number of input particles. We use a deep hidden physics-based neural network model to predict the behavior of particles throughout the simulation based on the equations of motion to achieve an efficient simulation and reduce the processing effort. We replace discrete element methods with inverse methods, which have the advantage of simulating velocity fields without knowing the simulation's boundary and initial conditions. Reconstruction of the velocity fields is done using a recurrent neural network in conjunction with a physics-based loss function. The proposed model is suitable for modeling problems that involve moving particles in a fixed bed. The number of neurons and activation functions in the artificial neural network are optimized, and the effect of the sampling method and the number of outputs are studied.