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# A New Theoretical Method for Analyzing Confined Dry Granular Flows

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**Abstract**
A granular body may deform in a continuous fashion such that the solid particles remain in close contact. Previous research works have always used the frictional Coulomb-like continuum treatment for analyzing granular bodies. However, this approach is only applicable for quasi-static conditions and cannot capture the complicated granular contact behavior of solid particles inside a failing granular body. This paper applies a revised Savage-Hutter equation to model granular flows moving down a confined, sloping channel. The Coulomb contact friction law is modified to consider the effect of the shear rate inside a granular body. This new method also considers the confinement effect of a sloping channel on granular flow mobility. The derived depth-averaged equations of motion bear a resemblance to nonlinear shallow-water wave equations. Results computed using the derived equations are compared with measurements from flume model tests and consistency is found between the two.