A Void Diffusion Model of Granular Flow JAYANTA RUDRA, PAUL VIETH, Oklahoma School of Science and Mathematics — In an earlier paper[1] we derived a nonlinear diffusion equation to describe the dynamics in granular flow based on a Diffusion Void Model (DVM). The equation was successfully used to describe the flow of a homogeneous granular material through the hole of a container under gravity. It also properly described similar flow in the presence of a flat horizontal barrier placed above the hole. Recently, however, we have found out that the above nonlinear equation does not lead to correct static equilibrium. For example, the stability of the free surface of a granular aggregate cannot be described by the equation. The equation also fails to describe, say, how an unstable vertical column of a granular material will change to a stable Λ-shaped pile at the angle of repose. In this paper work we derive an equation using an appropriate current density of voids that can explain all the observed dynamical characteristics of a simple granular state. [1]Jayanta K. Rudra and D. C. Hong, Phys. Rev. E47, R1459(1993).

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