LAGRANGIAN NUMERICAL MODEL OF A BINARY MIXTURE AND SEGREGATION PROCESSES

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Particle size segregation is a quite evident phenomenon taking place when initially mixed particles with different size, mass density, shape, are subjected to shearing or to any body force such as gravity or centrifugal forces. In debris flows, segregation moves big stones from the bank and the bed towards the free surface and the center of the stream and, by differential transport, to the front of the flood, with important effects on the flow resistance and on the stream evolution. In the present work a numerical model is developed in order to represent the simple particle movements in a binary mixture of spheres flowing over an inclined plane. The main aim is to quantify the stresses and to model of the segregation phenomenon, andto relate the forces acting on the different species to the gradient of concentration, the granular temperature,the tensor of the velocity deformation. It is assumed that the spheres are infinitely stiff; the collisions take place in an infinitesimal time and are only binary. The statistic of particle movements and collisions allows the computation of the profiles of mean velocity, of concentration and of pseudotemperature. The results show a clear segregation of the small particles near the bottom, with big particles floating over them.