

Mysterious Properties of Dilatant Fluids

Dilatant fluid usually acts like liquid, but if impacted by a force, it acts like a solid. This property is called dilatancy. This property could be useful for cushioning material. Therefore, this experiment explores the cushioning potential of a water-potato starch dilatant fluid. This was done by dropping one iron ball, iron ball A, on a second iron ball submerged in a fluid, iron ball B; two fluids were used, pure water (as the control) and the dilatant fluid. For both fluids, iron ball B was submerged by 2.5 cm and 4.0 cm. For water, iron ball A was dropped from 5 heights between 10 and 50 cm. For the dilatant fluid, iron ball A was also dropped from 50 cm, 75 cm and 100 cm. A force sensor measured the forces of impact. At iron ball B depth of 2.5 cm, impact force was reduced in dilatant fluid for drop heights at, or above, 30 cm; at depth of 4.0 cm, reduction in force was observed at all drop heights. Not all impacts were direct collisions, however, giving some error in these results. In conclusion, the dilatant fluid acted well as cushioning material with increasing drop height and greater submerged depth. While the results appear promising for cushioning material, more experiments should be done to verify these results. In addition, other dilatant fluids should be explored, such as one made from water and flour starch.