

Effect of grinding media properties in a traditional ball mill and stirred ball mill by DEM simulation

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A simulation of the three dimensional motion of balls in a traditional ball mill and stirred ball mill for the research of grinding mechanism has been carried out by DEM simulation. We studied the motion of the balls and the forces acting on them were calculated in the two different kinds of ball milling by DEM simulation. The effect of operational variables such as rotational speed, ball material and size on flow velocity, collision force and total impact energy was analyzed. The results showed that increased rotation speed with interaction impact energy between ball to ball, ball to pot's wall and ball to stirrer. The rotation speed increases with an increase the impact energy. Experiments were conducted to quantify grinding performance under the same conditions. The experimental results showed ball motion affects on the particle morphology, which was changed from irregular type to plate type with increasing rotation speed. The evolution depends on the impact energy increases of the balls. These findings are useful to understand and optimize the ball motion and grinding behavior of the traditional ball mill and stirred ball mill.