

Abstract Submitted
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Ballistic to centrifuging flow of granular materials in rotating tumblers RICHARD M. LUEPTOW, GABRIEL JUAREZ, PENGFEI CHEN, JULIO M. OTTINO, Northwestern University — The critical rotation speed for centrifuging of granular materials in horizontal rotating tumblers, determined by the Froude number, was studied experimentally and computationally as a function of the particle diameter, tumbler fill fraction, interstitial fluid, and tumbler length. Particle size does not affect the critical speed for centrifugation provided that the fill fraction is below 50%. The actual critical speed is typically 1.4 times the theoretical speed for centrifugation. Above 50% fill, the critical speed increases with particle size. Simulations indicate that even for the centrifuging condition there is relative motion of particles due to gravity, especially near the free surface. The presence of an interstitial fluid alters the critical speed due to buoyancy.

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