Circulation of particles in a spouted bed is influenced by the aspect ratio of the particles. Circulation of high-aspect particles, such as grains, is similar to bulk flow of powders within a hopper, while circulation of spherical particles is better represented by funnel flow.

Deposition of high quality and high integrity coatings on nuclear fuel particles requires good circulation of the fuel particles to ensure a narrow distribution of coating thicknesses and uniform coating properties. Spouting studies were conducted with using air at room temperature in a 2-D model of a nuclear fuel particle coater to investigate the influence of admixing high-aspect particles with the spherical particles as a means of promoting mass flow within the coating furnace. It was found that the admixture of cylindrical and spherical particles of similar diameters and densities affected mixing and the minimum spouting velocity.

Internal angles of repose were measured for a range of admixtures, from which the coefficients of internal friction were calculated and correlated with measured minimum spouting velocities. The minimum spouting velocities are compared with calculated values from published correlations and a revision to a correlation is proposed to incorporate the effects of internal friction on incipient spouting. Observations regarding particle circulation patterns and segregation are also presented.