

Minimum fluidizing velocity

$$1.75 \frac{\rho_f}{\rho_p \epsilon^3} U_0^2 + \frac{150(1-\epsilon_0)\mu}{D_p^2 \epsilon_0^2} U_0 - g(\rho_s - \rho_f) = 0$$

$$\text{Solve for } U_0 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} > 0$$

and this is the minimum velocity required for the bed to start fluidizing.