Fluid bed agglomeration is commonly used to improve the instant properties of spray-dried food powders. However, the fluidization of these particles is characterized by cracks and channels. Vibration or pulsation systems are frequently attached in the fluid bed equipments in order to improve the bed homogeneity and to allow the particles fluidization using lower fluidizing air flow. The aim of this work was to study the physical property modifications of soy protein isolate powder produced by a wet-agglomeration process in a pulse-fluid bed. The agglomeration experiments used commercial soy protein isolate powder (Supro® 780, The Solae Company, Brazil) as raw material. The equipment used was a batch-fluidized bed equipped with a rotating spherical valve installed below the air distribution plate that promotes the fluidizing air pulsation in the frequencies of 0, 300, 600 and 900 rpm. The process time, atomized binder flow (aqueous solution of maltodextrin, 49% w/w, at 27 °C), atomization pressure, nozzle height and mass of sample were maintained fixed at 40 min, 2.7 g/min, 0.55 bar, 300 mm and 0.15 kg, respectively. The air temperature and velocity were fixed at 75 °C and 0.57 m/s. The product transformations were determined by an analysis of the particle diameter, size distribution and morphology. The fluidization behavior was enhanced with the pulsation system, resulting in higher fluid bed homogeneity. Population balance modeling gives additional information about particles growth rate. The higher value of kernel constant ($\beta_0$) was obtained at 300 rpm, followed by 600 rpm, producing particles with higher size.