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Velocity and Trajectory Profiles of Soybean Grains in Cross Flow System

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Abstract

The velocity and trajectory profiles of threshed soybean grains obtained from the market were study with the aid of a cross flow classifier test rig and high speed camera. Experiments were conducted in triplicate for 2 mins per run at average feed height of 0.15 m, feed rate 320 kgh-1 and moisture content below 12%. Air speed of 12, 15 and 18 ms-1 and blower angle of inclination of 0, 22.5 and 45o were used for the study. A view area of about 1.0 m2 was used with a black color back ground. Illumination was provided by 4,000 and 1,500 W sets of halogen lamps located at the sides and top of the classifier chamber respectively. The velocity and trajectory profiles of the grains in the classifier chamber were obtained using a high speed motion camera (Motion Pro HS3). The camera was monitored with a laptop. Images of the soybean were adequately captured by the camera on grey scale using TIFF format/ file at 500 frames per second and the images were analyzed using a 2-Dimensional algorithm.

Keywords: Velocity profile, trajectory profile, grain distribution, Material transport, cross flow classifier