ABSTRACT

Hammer mill is a material size reduction tool because of the continuous collision between the material inserted with a hammer that rotates at high speed. The performance of hammer mill was investigated using discrete element modeling (DEM) through simulation experiment design so that virtual simulation environments could be developed to gain a fundamental understanding of the effect of hammer design on changes in milling results. The simulation model is based on the systematic design of experiment to find out the hammer design that gives the largest response value based on the most significant factor. The simulation results the loss energy (J) value of the coffee husks particles during a collision with a hammer that describing the occurrence of particle breakage within the hammer mill. The aim of study was to determine the new hammer design in order to increase the fineness of coffee husks. The study that has been run using DEM method and experimental design system concludes hammer design with combination of factor A and C which is adding blade and adding thickness gives the highest average response value is 826.88 J. The factor that increase the thickness becomes the most significant factor to the particles breakage of coffee husks with effect size of 356.41 J. Effect Interaction between factors also taken into account to know the influence of a factor on the existence of other factors in generating the response value.

Keywords : collision, hammer mill, hammer, discrete element method (DEM), *design of experiment* (DOE), *energy loss*