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ABSTRACTS**

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## ***MULTIPHASE MODELING OF PARTICLE MOVEMENT IN A HORIZONTAL BEAD MILL WITH DISK AGITATORS***

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### **Abstract:**

The multiphase modeling of particle movement in a horizontal bead mill with disk agitator using ANSYS Fluent and Rocky DEM. The modeling allowed for the analysis of particle dynamics, velocity distribution, and contact frequency with the material, revealing the impact of mill design on grinding efficiency. The combination of flow modeling (Fluent) and particle motion analysis (Rocky DEM) provided insights into their interaction.

As a result of research, it was found that:

1. Turbulent zones between the disks facilitate active mixing, while optimizing their geometry minimizes stagnant zones.
2. Most bead-particle contacts occur in the peripheral zone, where velocity is highest.
3. Increasing bead density enhances contact frequency but may lead to wear.
4. Optimized disk design improves particle circulation and grinding uniformity.

The modeling identified key parameters affecting the efficiency of the mill. The results can be utilized to improve the design, enhance productivity, and achieve uniform grinding.

**Key words:** *ANSYS Fluent, bead, dynamic, mill, modeling, multiphase, particle, Rocky DEM*