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# Some considerations on the parameters selection of DEM simulation for tumbling ball mills

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**Abstract**

The Discrete Element Method (DEM) is widely used on motion analysis of tumbling ball mills. Linear-spring dashpot model is one of the major contact models applying to the dynamics DEM simulation of the tumbling ball mills. Such model parameters as stiffness, damping coefficient, coefficient of restitution and coefficient of friction, significantly influence the calculation of contact forces and the selection of critical time step. However, there is no standard for reference to evaluate values of the parameters. Here, this paper focuses on the selection of parameters for the linear-spring dashpot model. A simulation of the movement of a single ball is performed, in which the maximum rising height of the ball is compared with the theoretically analyzed one. The results show that the method described in this paper by which the parameters could be determined is feasible.

***Key words***: *Discrete element method (DEM), Linear-spring dashpot model, Tumbling ball mill, Contact parameters*

## 1. Introduction

Grinding is an important operation in mineral processing. The power consumed by grinding accounts for 2.8%~3% of the world power. The tumbling ball mill is the major equipment for grinding, which involves so intricate parameters needed to be determined that this difficulty prohibits further research by a theoretical or experimental method.

Mishra and Rajamani (1990) applied the Discrete Element Method (DEM) on motion analysis of tumbling ball mills. They studied the dynamics of the ball media of tumbling ball mills, and established the simulation model of the charge motion. Kano *et al*., (1997) and other researchers (Mishra and Rajamani, 1992; Cleary *et al*., 2003) contributed a lot to the DEM solution and its applications in tumbling ball mills. Because of the availability of microscopic observation of the charge motion in tumbling ball mills, DEM is widely used.

Linear-spring dashpot model is one of the major contact models of the dynamics DEM simulation for the tumbling ball mill. Due to its simplicity in calculation, the linear model is widely used. However, there is no standard for reference to identify the parameters. Therefore, this paper focuses on the selection of parameters for the linear-spring dashpot model.

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