

USING STATIC MIXING TO PREVENT SEGREGATION IN HOPPERS

Watson L. Vargas, María Claudia Mejía, and Diana M. Lievano

*Department of Chemical Engineering
Universidad de los Andes
Bogotá, D.C Colombia*

Abstract

Segregation or demixing of granular materials is a difficult problem to deal with in different industrial settings. While an understanding of the dynamics of segregation has started to emerge, controlling segregation continues to be a complicated issue. Differences in size, density, shape, surface properties have been shown to promote segregation. Therefore any disparity in physicochemical or mechanical properties leads to demixing problems even when dealing with “uniform” materials. Using the concept of “time modulation” – via selective insert placement as suggested by (Shi *et al.*, PRL, 2007) – in this study we will explore the potential of developing static mixers for granular materials and its potential application to suppress segregation at the discharge of hoppers. We study bi-disperse (size or density), cohesionless granular materials in a quasi-two dimensional device by means of simulations and experiments. Results are presented for classic configurations of the inserts inside the hopper and for a new configuration that uses a static mixer prototype. Qualitative and quantitative evidence is presented, in terms of the intensity of segregation.

Keywords: Mixing, segregation, granular materials, particle dynamics, granular static mixer

Contact Author’s Information:

Name: Watson L. Vargas

Address: Cra. 1 Este No. 19A-40 Edificio Mario Laserna, Bogotá D. C., Colombia

Phone number: (571)339494949 Ext. 2798

e-mail address: wvargas@uniandes.edu.co

Presenting Author’s Information:

As above: Yes

or

Name:

Address:

Phone number:

e-mail address:

Please specify whether you wish to be considered for an oral ☒ or poster ☐ presentation.

Do you anticipate submitting a full paper to the special Mixing issue of the Canadian Journal of Chemical Engineering? Yes