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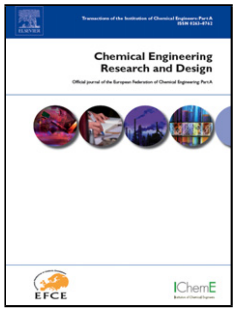

Title: Step by step methodology of designing a liquid-solid circulating fluidized bed using computational fluid dynamic approach

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PII: S0263-8762(18)30431-3
DOI: https://doi.org/10.1016/j.cherd.2018.08.031
Reference: CHERD 3325

To appear in:

Received date: 11-4-2017
Revised date: 5-5-2018
Accepted date: 22-8-2018

Please cite this article as: Palkar, Ritesh Ramesh, P.V., Suresh, Shilapuram, Vidyasagar, Step by step methodology of designing a liquid-solid circulating fluidized bed using computational fluid dynamic approach.Chemical Engineering Research and Design https://doi.org/10.1016/j.cherd.2018.08.031

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Step by step methodology of designing a liquid-solid circulating fluidized bed using computational fluid dynamic approach

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Highlights

- First study of step-by-step methodology in design of LSCFB through CFD approach
- First study on the operational stability/instability through CFD approach in LSCFB
- Helpful for analysis of geometrical and operating design variables for application

ABSTRACT

In this work, a systematic step-by-step methodology has been developed to identify the type of instabilities arise in achieving the continuous solids circulation achieved between riser and downcomer, and in establishing the proper pressure balance among the various units of a liquid-solid circulating fluidized bed (LSCFB) using transient three dimensional computational fluid dynamic (CFD) simulations. Different type of instabilities has been identified and systematically eliminated by choosing the appropriate measure in-terms of the geometry of a LSCFB. This resulted in studying five variant designs of LSCFB studies using CFD. The Eulerian-Eulerian approach is used to simulate the two-phase flow in LSCFB system. The hydrodynamic behavior of the system is studied in terms of the pressure drop,

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