International Journal of Advancements in Technology

OPEN ACCESS Freely available online

Opinion Article

Brief note on Computational Fluid Dynamics (CFD)

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ABOUT THE STUDY

Fluidized bed is the most common in solid-gas contractors in many processes such as reactions, drying, coating and size separation of the materials. The pneumatic fluidized bed is attracting the attention of engineers and researchers as an effective technique for various applications, and numerical simulation can play an increasingly important role in its development and optimization. Simulation requires significant improvements in the accuracy, performance, and efficiency of numerical models, but future development uses interactive simulation rather than gradual experimental scale to implement the so-called virtual reality of process engineering. This paper provides an important body of knowledge on developing mathematical Computational Fluid Dynamics (CFD) models and how to apply them to various fluidized beds. The examination is divided into three main parts. Fluidized bed reactors of the industrial application are in large scale. There are different flow systems for solid-liquid and pneumatic fluids. These chemical reactions are highly exothermic, fluidization ensures temperature uniformity, minimizes unnecessary side reactions, provides efficient heat transfer to cooling tubes, and is highly productive. Particular attention is paid to forces and moments of force acting on particles, packet modeling, drag models that are in homogeneity and structure, non-spherical particle models, heat and mass transfer, and turbulence. They discussed about the focusing of products play on the numerical models apply to fluidized bed systems used in chemistry and power engineering. The strengths and weaknesses of applying a CFD model to a fluidized bed system will be investigated and evaluated in the light of existing process. There are current research trends, identifying research gaps and opportunities for future ways, in which CFD can be applied to fluidized beds for energetic and chemical processes. We experimentally investigated the interaction of biomass from heavy metal-contaminated products bioremediation processes with the floor materials used for the fluidized bed gasifies, and found metals in syngas and solid residues. We have identified the origin of the gas and the quality that affects the fuel produced. We evaluated the properties of tree and herbaceous biomass previously used in the phytoremediation process.

CONCLUSION

The advantages of fluidized bed drying are low investment and maintenance costs, continuous large-scale production, lower temperatures than spray drying, relatively short drying times compared to freeze drying and vacuum drying, and solid substrate materials are usually supported by a porous plate called a diffuser. The liquid is then pushed up through the solid material. At lower liquid velocities, the solid remain in place as the liquid flows through the material are called as fixed bed reactor. As the velocity of the fluid increases, the reactor reaches a stage where the force of the fluid against the solid is sufficient to balance the weight of the solid. Fluidized bed reactors are more efficient due to the use of raw materials for the production of bio-oil. Fluidized bed reactors also use thermal carriers composed of small inorganic particles that are very efficient in providing high heat transfer coefficient at uniform bed temperatures.

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Received: 01-Apr-2022, Manuscript No. IJOAT-22-17479; **Editor assigned:** 8-Apr-2022, Pre Qc No. IJAOT-22-17479 (PQ); **Reviewed:** 22-Apr-2022, Qc No. IJOAT-22-17479; **Revised:** 27-Apr-2022, Manuscript No. IJOAT-22-17479 (R); **Published:** 06-May-2022, DOI: 10.35248/0976-4860.22.13.182

Citation: Jabbary A (2022) Brief note on Computational Fluid Dynamics (CFD). Int J Adv Technol. 13:182.