Dense gas-particle suspension upward flow used as heat transfer fluid in solarreceiver: PEPT experiments and 3D numerical simulations

Renaud Ansart, Pablo Garcia Triñanes, Benjamin Boissière, Hadrien Benoit, Jonathan Seville, Olivier Simonin

PII: S0032-5910(16)30776-8
DOI: doi: 10.1016/j.powtec.2016.11.006
Reference: PTEC 12082

To appear in: *Powder Technology*

Received date: 21 June 2016
Revised date: 4 November 2016
Accepted date: 5 November 2016

Please cite this article as: Renaud Ansart, Pablo Garcia Triñanes, Benjamin Boissière, Hadrien Benoit, Jonathan Seville, Olivier Simonin, Dense gas-particle suspension upward flow used as heat transfer fluid in solarreceiver: PEPT experiments and 3D numerical simulations, *Powder Technology* (2016), doi: 10.1016/j.powtec.2016.11.006

Dense gas-particle suspension upward flow used as heat transfer fluid in solar receiver: PEPT experiments and 3D numerical simulations

Renaud Ansart[a], Pablo Garcia Triñanes[b], Benjamin Boissière[a], Hadrien Benoit[a], Jonathan Seville[b], Olivier Simonin[c]

[a]*Laboratoire de Génie Chimique, Université de Toulouse, CNRS, INPT, UPS, Toulouse, France*
[b]*Department of Chemical and Process Engineering [J2], University of Surrey, Guildford, GU2 7XH, United Kingdom*
[c]*Institut de Mécanique des Fluides de Toulouse (IMFT), Université de Toulouse, CNRS, INPT, UPS, Toulouse, France*

Abstract

A dense particle suspension, also called an upflow bubbling fluidized bed, is an innovative alternative to the heat transfer fluids commonly used in concentrated solar power plants. An additional advantage of this technology is that it allows for direct thermal storage due to the large heat capacity and maximum temperature of the particle suspension. The key to the proposed process is the effective heat transfer from the solar heated surfaces to the heat transfer fluid, i.e. the circulating solid suspension. In order to better understand the process and to optimise the design of the solar receiver, it is of paramount importance to know how particles behave inside the bundle of small tubes. To access to the particle motion in the solar receiver, two different techniques are carried out: experimental using Positron Emission

*Corresponding author.
Email address: renaud.ansart@ensiacet.fr, Tel: +33 5 34 32 37 01 (Renaud Ansart)