Prediction of multiphase combustion and ash deposition within a biomass furnace.

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RESUMEN:

A steady turbulent CFD analysis of the combustion process in a non-conventional biomass furnace, originally developed for the combustion of bagasse, is presented. However, in order to assess the potentiality of this furnace geometry to efficiently work using different fuels, here lauan wood is considered.

The computational scheme here adopted was successfully validated in a previous analysis (Venturini et al. Energy, vol. 35. Elsevier; 2010, 3008-21). It is based on a three-steps approach: solid-phase combustion, gas-phase combustion and tracking (and deposit) of fly ashes.

The analysis demonstrated that an efficient combustion of lauan wood is achieved and allows to detect the regions where the main deposition of ashes occurs.

Deposit mostly forms on the top of the furnace showing a deposition rate comparable with that experimentally measured in previous analysis (Venturini et al. Applied Thermal Engineering, http://dx.doi.org/10.1016/j.applthermaleng.2011.08.030).

Key words:

Ashes deposition; Biomass furnaces; Particle cloud tracking model; Solid- and gas-phase combustion.