

INTISARI

Biomassa merupakan sumber energi terbarukan yang berasal dari tanaman, mikroorganisme, limbah pertanian, dan kotoran manusia atau hewan. Sumber energi dari biomassa sangat cocok diterapkan di Indonesia karena sumber daya alam yang beragam. Oleh karena itu diperlukan pengembangan teknologi untuk memanfaatkan energi dari biomassa. Salah satu teknologi yang dapat digunakan adalah gasifikasi dengan menggunakan *circulating fluidized bed* (CFB). Sirkulasi *bed material* merupakan faktor yang penting dalam sistem CFB. *Bed material* harus bersirkulasi sesuai arah tertentu. *Seal* digunakan untuk mencegah aliran *bypass*.

Penelitian ini menguji karakteristik *cold flow* dari *circulating fluidized bed*. Karakteristik *cold flow* yang dianalisa meliputi distribusi tekanan, laju resirkulasi *bed material*, dan laju aliran fluida di *standpipe* dengan variasi debit aerasi (Q_1) *seal* dan variasi jenis *seal*. Pengujian ini dilakukan dengan menggunakan metode *computational particle fluid dynamics* (CPFD) yang diimplementasikan pada *software* Barracuda Virtual Reactor.

Berdasarkan pengujian pada CFB dengan metode CPFD, diperoleh hasil yaitu kenaikan debit aerasi dan memvariasikan jenis *seal* mempengaruhi distribusi tekanan, laju resirkulasi *bed material*, dan laju aliran fluida di *standpipe*. Untuk setiap kenaikan Q_1 , terjadi kenaikan laju resirkulasi *bed material*.

Kata kunci: *Circulating fluidized bed*; *Cold flow*; *Computational particle fluid dynamics*; Distribusi tekanan; Laju resirkulasi *bed material*; Laju aliran fluida.

ABSTRACT

Biomass is a sustainable energy source that comes from plants, microorganism, agricultural waste, and human or animal feces. Energy source from biomass is suitable to be applied in Indonesia because of diverse natural resources. Therefore, the development of technology to utilize energy from biomass is needed. One of the technologies that can be used is gasification using circulating fluidized bed (CFB). The circulation of bed material is an important factor in CFB system. Bed material should be circulated in the specified direction. Seal was used to prevent bypass flow.

This research investigates cold flow characteristics of circulating fluidized bed. The cold flow characteristics that were analyzed included pressure distribution, bed material recirculation rate, and fluid flow in standpipe with the variation of seal aeration flow rate and variation of seal type. This test was using computational particle fluid dynamics (CPFD) method which was implemented in the software named Barracuda Virtual Reactor.

Based upon the test on CFB using CPFD method, the results were increasing value of aeration flow rate and varying seal type affects the pressure distribution, bed material recirculating rate, and fluid flow in standpipe. For every increased value of Q_1 , the bed material recirculating rate also increases.

Keywords: Circulating fluidized bed; Cold flow; Computational particle fluid dynamics; Pressure distribution; bed material recirculating rate; Fluid flow.