

Brereton C, Grace J R, Lim C J and Zhu J-X, "Engineering Aspects of Recirculating Fluidized Bed Combustion", in *Chemical Reactor Technology for Environmentally Safe Reactors and Products*, ed. HI de Lasa, Kluwer Academic Publisher, Boston, pp 507-536, 1993.

## **Abstract**

Circulating fluidized bed combustors are increasingly commonly used for environmentally sound steam generation from fossil fuels and other low value energy sources. Low uniform combustion temperatures and air staging produce low NO<sub>x</sub> emissions, while sulphur oxides may be scrubbed cheaply by in-bed sorbent addition. However, optimal design of circulating fluidized bed boilers for maximum multifuel capability and turndown is hindered by a lack of fundamental understanding of the fluid and particle mechanics. This paper discusses how an understanding of the fluid mechanics may be used to scale-up from pilot plant systems to full scale combustors. Key engineering aspects, geometric optimization, fluid mechanics scale-up, and heat transfer coefficient prediction are each discussed. Observed pollutant formation trends are also rationalized in terms of the solids distributions in the circulating fluidized bed.