This work discusses operational regimes in CFB furnaces by means of mapping the relation between fluidization velocity, riser pressure drop and external solids circulation. A cold CFB unit with riser dimensions $0.8 \times 0.12 \times 8.5$ m is used, thus yielding a riser height-to-width aspect ratio of 10.6, similar to that of typical CFB boilers (1). The overall flow regime established in the unit has been shown to be representative for large-scale CFB boilers, while providing the opportunity to investigate a wide range of operational parameters, including such that are not easily applicable to real boilers. The operational conditions covered fluidization velocities from 0.2 to 5 m/s and riser pressure drop from 1.3 to 11 kPa, which resulted in solids net circulation up to 50 kg/m$^2$s.

The riser is equipped with 25 pressure transducers in order to provide resolve relevant gradients in the vertical distribution of solids concentration. The solids net circulation is measured during operation by using a valve in the cyclone dipleg which, when closed, acts as a gas distributor. In the present work, three air-distributor plates were used, covering pressure-drop characteristics similar to what is typically used in lab-units, bubbling fluidized bed boilers and circulating fluidized bed boilers.

The paper presents results which relate fluidization velocity, riser pressure drop and external solids circulation under different operational regimes ranging from bubbling conditions to pneumatic transport. The results are compared with data from industrial boilers.

REFERENCES