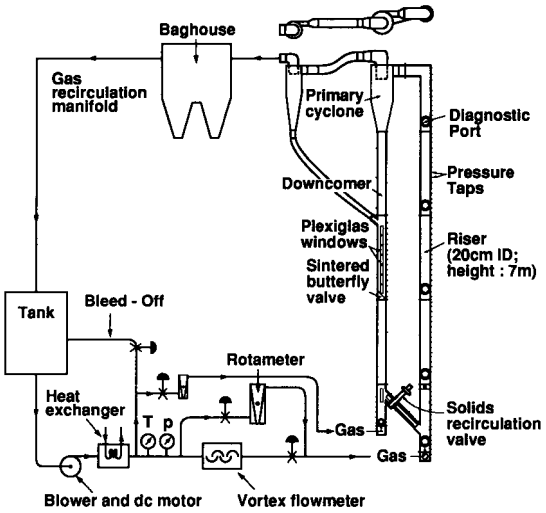
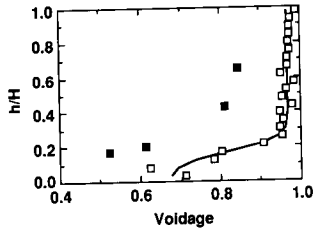
Louge M., Lischer D.J. and Chang H.: "Measurements of Voidage near the Wall of a Circulating Fluidized Bed Riser," *Powder Tech.* **62**, 269-76 (1990).

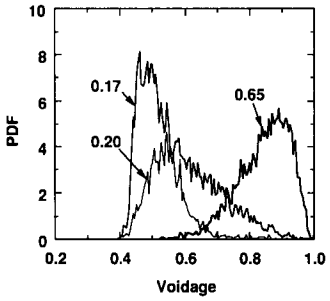
Quantitative, time-dependent, non-intrusive capacitance measurements of voidage in the wall region of a circulating fluidized bed of cracking catalyst are reported. The data confirms the presence of a denser annulus of solids near the wall, which exhibits a vertical voidage profile similar to that observed for the average cross-sectional voidage. A statistical analysis shows that the average wall voidage in the dense lower region of the bed is nearly independent of the total solid flux, that it expands linearly with superficial gas velocity, and that its fluctuations are limited to low frequencies.



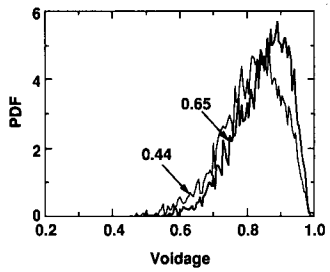
The circulating fluidized bed facility.



Vertical voidage profiles in the riser for the conditions: u_0 = 2m/sec and G_S = 17 kg/m^2.sec. The open squares are average voidages inferred from the vertical pressure gradients and the solid line is a fit using the exponential expression of Li and Kwauk [14]. The solid squares are time-average voidages measured by the capacitance probe for a total sampling time of 120 sec.



Voidage PDF at different riser elevations for the conditions of Fig. 5. Each PDF is constructed with 4096 samples at a sampling rate of 100 Hz. Relative elevations h/H are shown. The inflection point of the vertical voidage profile is located at $h_i/H = 0.17$ above the distributor. At h/H = 0.17, the average voidage is $\bar{\varepsilon} = 0.52$, its standard deviation is $\sigma = 0.07$ and its skewness is S = 2.4; at h/H = 0.20, $\bar{\varepsilon} = 0.61$, $\sigma = 0.11$, S = 0.60; at h/H = 0.65, $\bar{\varepsilon} = 0.84$, $\sigma = 0.08$, S = - 0.73.



Voidage PDF's in the dilute region for the conditions of Fig. 5 and 6. Relative elevations are shown. At h/H=0.44, $\bar{\varepsilon} = 0.81$, $\sigma = 0.09$ and S = - 0.63.