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## Nomenclature:

- $A_b$  : Cross sectional area of the bed ( $m^2$ ).  
 $A_c$  : Surface area of the distributor cap ( $m^2$ ).  
 $A_d$  : Cross sectional area of the downcomer ( $m^2$ ).  
 $A_{htp}$  : Surface area of the heat transfer probe ( $m^2$ ).  
 $C_d$  : Orifice discharge coefficient.  
 $d_{or}$  : Orifice diameter (m)  
 $d_p$  : Particle diameter (mm).  
 $\varepsilon$  : Voidage.  
 $\varepsilon_{mf}$  : Voidage at minimum fluidization.  
 $f$  : Average fraction of the wall area covered by clusters.  
 $g$  : Acceleration due to gravity ( $m/s^2$ )  
 $h$  : Heat transfer coefficient ( $W/m^2-K$ )  
 $H_{mf}$  : Bed height at minimum fluidization (m)  
 $\Delta h$  : Difference in height of manometric fluid of water column (cm)  
 $I$  : Bed inventory (kg)  
 $K$  : Thermal conductivity ( $W/m^\circ C$ )  
 $L_a$  : Solid accumulation height (m)  
 $L_m$  : Difference between two consecutive pressure taps (m)  
 $N_{or}$  : Number of orifices in the distributor  
 $\Delta P$  : Difference in height of the manometric fluid (cm)  
 $\Delta P_b$  : Bed pressure drop  $N/m^2$   
 $\Delta P_d$  : Distributor pressure drop  $N/m^2$   
 $q$  : Rate of heat supplied (watt)  
 $t$  : Time(s)  
 $T$  : Temperature  $^\circ C$   
 $T_b$  : Bulk temperature  $^\circ C$   
 $T_{bi}$  : Bed temperature  $^\circ C$   
 $T_{bs}$  : Bulk surface temperature  $^\circ C$   
 $U_{mf}$  : Minimum fluidization velocity (m/s)  
 $U_{sup}$  : Superficial velocity (m/s)  
 $U_t$  : Terminal velocity of the particle (m/s)  
 $V$  : Supply voltage (volt)  
 $\rho_g$  : Gas density ( $kg/m^3$ )  
 $\rho_{sus}$  : Suspension density ( $kg/m^3$ )