

NOMENCLATURE

- Ar - Archimedes number, $Ar = \frac{d_p^3 \rho_g (\rho_p - \rho_g) g}{\mu_g^2}$
- A - a dimensionless constant in Eqs. (10) and (22)
- B - magnetic field induction, T
- BS - magnetic field induction at saturation, T (a term used by Al-Qodah. It corresponds to the point defined by the magnetization at saturation, Ms)
- B - a constant in Eqs. (10) and (22), m/A
- Bi - heat transfer Biot number, $Bi = \frac{h.R}{k}$
- C - a dimensionless constant
- Cp - specific heat capacity, J/kg K
- Dc - column diameter, m
- Ds - internal diameter of the magnetic system, m
- F - an objective function defined by Arnaldos (1986).
- Fo - Fourier number, $Fo = \frac{\alpha.\tau}{R^2}$
- f - frequency, Hz
- g - gravitational constant, m/s²
- H - magnetic field intensity, A/m
- Hstr - magnetic field intensity at which particle “strings” emerged, A/m (Hristov, 1998)
- Hfr - freezing field intensity, A/m (see comments in (Hristov, 1998)
- h_b - bed height, m
- h_{bo} - initial bed height, m
- h - heat transfer coefficient, W/m²K
- h₀ - heat transfer coefficient in absence of a field, W/m²K
- h_w - heat transfer coefficient between the bed and an immersed surface defined by Eq. 8, W/m²K
- h_{wL} - local heat transfer coefficient between the bed and an immersed surface, W/m²K
- maxh_w - maximum heat transfer coefficient, W/m²K
- k - thermal conductivity, W/m K
- k_b - effective thermal conductivity of the bed, W/m.K
- L - axial distance along the particle bed, m

- L_c - fluidization column length, m
 L_s - height of the magnetic system used, m
 M_s - magnetization at saturation, A/m
 Nu - Nusselt number
 Nu_{max} - Nusselt number calculated with *max* h_w
 Q - total heat power, W
 q - heat flux per unit area of the heater, W/m²
 $\dot{q}$ - heat transfer flux rate, W/m².s
 $Re = \frac{\rho_p U d_p}{\mu_g}$ - particle Reynolds number
 $Ro = \frac{\tau_{off}}{\tau_{on}}$ - ratio of the pulsed field periods with the "On-Off" mode
 r - radial co-ordinate, m
 r_c - column radius, m
 Δr - difference of radial co-ordinates, m
 S - heater surface, m²
 S_0 - a dimensionless group defined by relationship (18)
 S_1 - a dimensionless group defined by relationship (28)
 T - temperature, K (or °C)
 T_w - surface temperature of the probe wall, K
 T_b - fluidized bed average temperature, K
 T_0 - room temperature, K
 ΔT - temperature difference, K (or °C)
 ΔT_r - radial temperature difference, K (or °C)
 $tg\varphi$ - the slope of the lines in Fig. 31b
 U - superficial gas velocity, m/s
 U_{mfo} - minimum fluidization velocity in the absence of a magnetic field, m/s
 U_{mf} - minimum fluidization velocity at $H>0$), m/s
 $X = X_M^M$ - mass fraction of the magnetic particles in the mixture, % mass.

Greek letters

- $\alpha = \frac{k}{\rho C_p}$ - thermal diffusivity, m²/s
 γ - angle defining the direction of radial temperature measurements (Arnaldos' results), deg

$$\delta_L = \frac{\Delta L}{D_C} \text{ -dimensionless axial position}$$

- ε - bed voidage
 μ_0 - magnetic permeability of the vacuum, H/m
 ρ - density, kg/m³
 τ_{on} - length of the magnetization period, s
 τ_{off} - length of the mixing period, s
 θ - angular co-ordinate, deg

Subscripts

- Exp. - experimental
Calc.- calculated
g - gas
p - particle

Abbreviations

- MSB- magnetically stabilized bed

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