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NOMENCLATURE

μ = Dynamic viscosity (cP).

μ_{nf} = Viscosity of nanofluids (cP).

μ_{bf} = Viscosity of basefluid (cP).

μ_r = Relative dynamic viscosity.

φ = Mass concentration of nano particles.

φ_v = Volumetric concentration of particles.

R = Corrosion rate, mg/cm^2/week.

W_b = Weight of test specimen before test (mg).

W_a = Weight of test specimen after test (mg).

B = Weight loss of blank (mg).

A = Heat-flux surface area inside O-ring (cm^2) = 5.5 cm diameter circular area.

k = Thermal conductivity (W/m K).

k_{nf} = Thermal conductivity of nanofluids (W/mK).

k_{bf} = Thermal conductivity of base fluid (W/mK).

k_{eff} = Effective thermal conductivity of the mixture (W/mK).

k_p = Thermal conductivity of the particles (W/mK)

T_{nf} = Temperature of nanofluids (°C).

T_{max} = Maximum Temperature of nanofluids in the experimental data (°C).

d_p = Diameter of the nano particles (nm).

d_p^* = The upper limit of the diameter of the nano particles (nm).

α_p = Thermal diffusivity of nano particle (m^2/s).

α_w = Thermal diffusivity of water (m^2/s).

T = Temperature (°C).

Q = Rate of heat transfer (W).

(Δt)_h = Temperature difference (between inlet and outlet) for hot fluid (°C).

(Δt)_c = Temperature difference (between inlet and outlet) for cold fluid (°C).

(Δt)_i = Inside temperature of the radiator (°C).

(Δt)_o = Outside temperature of the radiator (°C).

NTU = Number of Transfer Units.

U_i = Overall heat transfer coefficient inside the tube of radiator (W/m^2 K).
\( A_t \) = Area inside the tube of radiator (m\(^2\)).
\( A_o \) = Area outside the tube of radiator (m\(^2\)).
\( C_{\text{min}} \) = Smaller value of \( m_h c_h \) and \( m_c c_c \) (W/K).
\( m_h \) = Mass flow rate of hot fluid (kg/s).
\( c_h \) = Specific heat of hot fluid (J/kg K).
\( m_c \) = Mass flow rate of cold fluid (kg/s).
\( c_c \) = Specific heat of cold fluid (J/kg K).
\( h_i \) = Heat transfer coefficient on inner side of tube(W/m\(^2\) K).
\( h_o \) = Heat transfer coefficient on outer side of the tube(W/m\(^2\) K).
\( \Delta T_{\text{lm}} \) = Logarithmic mean temperature.
\( T_{H1} \) = Entry temperature of hot fluid (K).
\( T_{H2} \) = Leaving temperature of hot fluid (K).
\( T_{C1} \) = Entry temperature of cold fluid (K).
\( T_{C2} \) = Leaving temperature of cold fluid (K).
\( T_1 \) = Air inlet temperature (°C).
\( T_2 \) = Air outlet temperature (°C).
\( T_3 \) = Coolant inlet temperature (°C).
\( T_4 \) = Coolant outlet temperature (°C).

Temperatures \( T_5 \) to \( T_{16} \) represents the temperature of various thermocouples placed at various locations on the radiator.

\( P_{\text{pump}} \) = Pumping power of the pump (W).
\( \Delta P \) = Pressure difference (Pa).
\( \rho \) = Density of the fluid (kg/m\(^3\)).
\( m \) = Mass flow rate of the fluid (kg/s).
\( f \) = Friction factor.
\( u_m \) = Mean velocity of the fluid (m/s).
\( L \) = Length of the radiator tube (m).
\( D \) = Inside diameter of the radiator tube (m).
\( Re_D \) = Reynolds number with diameter of the tube of the radiator.
\( Re \) = Reynolds number.
\( Nu \) = Nusselt number.
\( Pr \) = Prandtl number.
\( St \) = Stanton number.
\[ Pr_w \] = Prandtl number at the wall temperature of the radiator.
\[ \frac{u_{Re}}{Re} \] = Uncertainty in the calculation of Reynolds number.
\[ \frac{u_p}{p} \] = Uncertainty in the measurement of density of the fluid.
\[ \frac{u_u}{u} \] = Uncertainty in the measurement of velocity of the fluid.
\[ \frac{u_\mu}{\mu} \] = Uncertainty in the measurement of viscosity of the fluid.
\[ \frac{u_q}{q} \] = Uncertainty in the calculation of heat flux.
\[ \frac{u_V}{V} \] = Uncertainty in the measurement of voltage.
\[ \frac{u_f}{f} \] = Uncertainty in the measurement of current.
\[ \frac{u_h}{h} \] = Uncertainty in the calculation of heat transfer coefficient.
\[ \frac{u(T_w-T_b)}{(T_w-T_b)} \] = Uncertainty in Temperature measurement.
\[ \frac{u_{Nu}}{Nu} \] = Uncertainty in the calculation of Nusselt number.
\[ \frac{u_k}{k} \] = Uncertainty in the measurement of thermal conductivity.