TABLE 7-5 (from Çengel and Cimbala, *Fluid Mechanics: Fundamentals and Applications*, McGraw-Hill, 2006)
Some common established nondimensional parameters or Πs encountered in fluid mechanics and heat transfer; A is a characteristic area, D is a characteristic diameter, f is a characteristic frequency (Hz), L is a characteristic length, t is a characteristic time, T is a characteristic (absolute) temperature, V is a characteristic velocity, W is a characteristic width, $\dot{W}$ is a characteristic power, ω is a characteristic *radial* frequency or angular velocity (radians/s). Other parameters and fluid properties in these Πs include: c = speed of sound, c_p, c_v = specific heats, d_p = particle diameter, D_{AB} = species diffusion coefficient, h = convective heat transfer coefficient, h_{fg} = latent heat of evaporation, k = thermal conductivity and also k = ratio of specific heats, P = pressure, T_{sat} = saturation temperature, $\dot{V}$ = volume flow rate, α = thermal diffusivity, β = coefficient of thermal expansion, λ = mean free path length, μ = viscosity, ν = kinematic viscosity, ρ = fluid density, ρ_f = liquid density, ρ_p = particle density, ρ_s = solid density, ρ_v = vapor density, σ_s = surface tension, and τ = shear stress.

Name	Definition	Ratio of significance
Archimedes number	$\text{Ar} = \dfrac{\rho_s g L^3}{\mu^2}(\rho_s - \rho)$	$\dfrac{\text{gravitational force}}{\text{viscous force}}$
aspect ratio	$\text{AR} = \dfrac{L}{W}$ or $\dfrac{L}{D}$	$\dfrac{\text{length}}{\text{width}}$ or $\dfrac{\text{length}}{\text{diameter}}$
Biot number	$\text{Bi} = \dfrac{hL}{k}$	$\dfrac{\text{convective heat transfer}}{\text{conduction heat transfer}}$
Bond number	$\text{Bo} = \dfrac{g(\rho_f - \rho_v)L^2}{\sigma_s}$	$\dfrac{\text{gravitational forces}}{\text{surface tension forces}}$
cavitation number	$\text{Ca (sometimes } \sigma_c) = \dfrac{P - P_v}{\rho V^2}$ $\left(\text{sometimes } \dfrac{2(P - P_v)}{\rho V^2}\right)$	$\dfrac{\text{pressure - vapor pressure}}{\text{inertial pressure}}$
Darcy friction factor	$f = \dfrac{8\tau_w}{\rho V^2}$	$\dfrac{\text{wall friction forces}}{\text{inertial forces}}$
drag coefficient	$C_D = \dfrac{F_D}{\frac{1}{2}\rho V^2 A}$	$\dfrac{\text{drag force}}{\text{dynamic force}}$
Eckert number	$\text{Ec} = \dfrac{V^2}{C_P T}$	$\dfrac{\text{kinetic energy}}{\text{enthalpy}}$
Euler number	$\text{Eu} = \dfrac{\Delta P}{\rho V^2}$ $\left(\text{sometimes } \dfrac{\Delta P}{\frac{1}{2}\rho V^2}\right)$	$\dfrac{\text{pressure difference}}{\text{inertial pressure}}$
Fanning friction factor	$f_F = \dfrac{2\tau_w}{\rho V^2}$	$\dfrac{\text{wall friction forces}}{\text{inertial forces}}$
Fourier number	$\text{Fo (sometimes } \tau) = \dfrac{\alpha t}{L^2}$	$\dfrac{\text{physical time}}{\text{thermal diffusion time}}$
Froude number	$\text{Fr} = \dfrac{V}{\sqrt{gL}}$ $\left(\text{sometimes } \dfrac{V^2}{gL}\right)$	$\dfrac{\text{inertial forces}}{\text{gravitational forces}}$
Grashof number	$\text{Gr} = \dfrac{g\beta\lvert\Delta T\rvert L^3\rho^2}{\mu^2}$	$\dfrac{\text{buoyancy forces}}{\text{viscous forces}}$
Jakob number	$\text{Ja} = \dfrac{C_P(T - T_{\text{sat}})}{h_{fg}}$	$\dfrac{\text{sensible energy}}{\text{latent energy}}$
Knudsen number	$\text{Kn} = \dfrac{\lambda}{L}$	$\dfrac{\text{mean free path length}}{\text{characteristic length}}$

Name	Definition	Ratio of significance
Lewis number	$\mathrm{Le} = \frac{k}{\rho C_P D_{AB}} = \frac{\alpha}{D_{AB}}$	$\frac{\text{thermal diffusion}}{\text{species diffusion}}$
lift coefficient	$C_L = \frac{F_L}{\frac{1}{2}\rho V^2 A}$	$\frac{\text{lift force}}{\text{dynamic force}}$
Mach number	$\mathrm{Ma}\ (\text{sometimes M}) = \frac{V}{c}$	$\frac{\text{flow speed}}{\text{speed of sound}}$
Nusselt number	$\mathrm{Nu} = \frac{Lh}{k}$	$\frac{\text{convection heat transfer}}{\text{conduction heat transfer}}$
Peclet number	$\mathrm{Pe} = \frac{\rho LVC_p}{k} = \frac{LV}{\alpha}$	$\frac{\text{bulk heat transfer}}{\text{conduction heat transfer}}$
power number	$\mathrm{N_P} = \frac{\dot{W}}{\rho D^5 \omega^3}$	$\frac{\text{power}}{\text{rotational inertia}}$
Prandtl number	$\mathrm{Pr} = \frac{\nu}{\alpha} = \frac{\mu C_P}{k}$	$\frac{\text{viscous diffusion}}{\text{thermal diffusion}}$
pressure coefficient	$\mathrm{C_p} = \frac{P - P_\infty}{\frac{1}{2}\rho V^2}$	$\frac{\text{static pressure difference}}{\text{dynamic pressure}}$
Rayleigh number	$\mathrm{Ra} = \frac{g\beta \lvert \Delta T \rvert L^3 \rho^2 C_P}{k\mu}$	$\frac{\text{buoyancy forces}}{\text{viscous forces}}$
Reynolds number	$\mathrm{Re} = \frac{\rho VL}{\mu} = \frac{VL}{\nu}$	$\frac{\text{inertial forces}}{\text{viscous forces}}$
Richardson number	$\mathrm{Ri} = \frac{L^5 g \Delta\rho}{\rho \dot{V}^2}$	$\frac{\text{buoyancy forces}}{\text{inertial forces}}$
roughness ratio	$\frac{\varepsilon}{L}$	$\frac{\text{roughness height}}{\text{characteristic length}}$
Schmidt number	$\mathrm{Sc} = \frac{\mu}{\rho D_{AB}} = \frac{\nu}{D_{AB}}$	$\frac{\text{viscous diffusion}}{\text{species diffusion}}$
Sherwood number	$\mathrm{Sh} = \frac{VL}{D_{AB}}$	$\frac{\text{overall mass diffusion}}{\text{species diffusion}}$
specific heat ratio	$k\ (\text{sometimes } \gamma) = \frac{c_P}{c_v}$	$\frac{\text{enthalpy}}{\text{internal energy}}$
Stanton number	$\mathrm{St} = \frac{h}{\rho C_p V}$	$\frac{\text{heat transfer}}{\text{thermal capacity}}$
Stokes number	$\mathrm{Stk}\ (\text{sometimes St}) = \frac{\rho_p d_p{}^2 V}{18\mu L}$	$\frac{\text{particle relaxation time}}{\text{characteristic flow time}}$
Strouhal number	$\mathrm{St}\ (\text{sometimes S or Sr}) = \frac{fL}{V}$	$\frac{\text{characteristic flow time}}{\text{period of oscillation}}$
Weber number	$\mathrm{We} = \frac{\rho V^2 L}{\sigma_s}$	$\frac{\text{inertial forces}}{\text{surface tension forces}}$