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Defining Ambient Conditions

Use *Ambient Conditions* to specify the characteristics of the ambient fluid for flow modeling, as well as the gravitational acceleration and direction.

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In a Duct flow analysis, *Static Pressure* and *Ambient Temperature* values entered on the form define default conditions for a *Inlet/Outlet* entity. (You can also create *Inlet/Outlet* entities at a specified temperature and pressure different from the ambient fluid.) When modeling a closed loop, *Static Pressure* and *Ambient Temperature* values determine the total mass contained when the loop was sealed. These values also affect convective heat transfer coefficients for Forced Convection and Free Convection entities.

Default values are provided for *Static Pressure*, *Ambient Temperature* and *Gravitational Acceleration*.

When modeling Duct flow, Free Convection and Forced Convection, the TMG 1-D flow solver always calculates buoyancy for gas, even though it may be insignificant in some forced convection models. Hence you should always select *Gravity Vector*.

Specifying an Ambient Fluid Material

The ambient *Material* defines the material for fluid analysis; default selections for Water or Air are provided. You can also define your own ambient fluid, which must be of the Material Type *Fluid/Thermal* (either liquid or gas).

For a gas, you must also choose whether to use the *Gas Constant* from the material table, or a *Reference Temperature*. This is the temperature at which fluid density is assumed to be defined in the material table. From that information TMG calculates a gas constant and uses it to update the density at run time. If you select *Gas Constant*, TMG applies the gas constant specified in the material table; the value for density in the material table is ignored.

If you define an ambient pressure value that differs significantly from the pressure at which the material fluid density of the duct elements is defined, you must use one of two methods to obtain valid results:

Method 1 - On the Ambient Conditions form:

1. Specify *Other* material and select the fluid material used for the ducts.

2. Select the *Use Gas Constant from Material Table* option. Material density will be calculated from the pressure and temperature at solve, and the gas constant value specified.

Method 2 - In the Meshing task, create a *Thermal/Fluid* type material:

1. Define the duct element fluid material with a density appropriate to the pressures in the model.

Specifying the Gravity Vector

The buoyant effect of gravity is always modeled with fluids in TMG. If this effect is significant, you must define the gravity vector.

Use *Gravity Vector* to select the gravity vector from geometry on screen, or use *Cartesian* or *Spherical coordinate* systems. For *Spherical coordinates*, *Theta* is the angle the gravity vector makes with the Z axis and *Phi* is the angle that it makes with the X axis when projected onto the XY plane.

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