

# CHAPTER 18 THE ASCEND PREDEFINED COLLECTION OF MODELS

The ASCEND system has a main directory of libraries and application models: `ascend4/models`. One can examine and execute these examples when learning how to model in ASCEND.

## **system.a41**

The file called *system.a41* in the libraries must always be loaded first in the ASCEND system. It is automatically loaded when one starts the ASCEND system. However, the *delete all types* command will delete all type definitions including the ones in this file. If you have deleted all types, always reload this file first using the *Read* instruction in the Library tool set.

## **atoms.a41**

The simplest collection of previously defined types are those which define the kinds of constants, parameters and variables we are likely to use in constructing an engineering or scientific model. A file called *atoms.a41* located in the libraries subdirectory has over 125 types of constants, parameters and variables. Following are three of the definitions it contains.

```

CONSTANT critical_compressibility REFINES
    real_constant DIMENSIONLESS;                                1
                                                                2
UNIVERSAL CONSTANT speed_of_light                               3
REFINES real_constant ::= 1{LIGHT_C};                          4
                                                                5
ATOM volume REFINES solver_var                                  6
    DIMENSION L^3                                               7
    DEFAULT 100.0{ft^3};                                         8
    lower_bound := 0.0{ft^3};                                    9
    upper_bound := 1e50{ft^3};                                  10
    nominal := 100.0{ft^3};                                     11
END volume;                                                    12

```

Note that the first and third include a statement of the dimensionality of the item being defined. For example critical compressibility is dimensionless while the dimensions for volume are  $L^3$  (i.e., length cubed). The ASCEND system supports nine basic dimensions as defined for the standards defining the SI system of units. Dimensions

differ from units in that *length* is a dimension while *feet* is a set of units one may use to express a length. Dimensions in ASCEND are L (length: typical units being ft, m), M (mass: kg, lbm), T (time: s, yr), E (electric current: amp), Q (quantity: mole), TMP (temperature: K, R), LUM (luminous intensity: candela), P (plane angle: radian) and S (solid angle: steradian). We have also included the tenth dimension C (currency: USdollar) so one can express cost. If you wish to express cost in a variety of different currencies (e.g., USdollars, UKpounds), you will have to define the conversion rates.

(See the manual entitled The ASCEND IV language syntax and semantics for more information on dimensionality and units.)

### **Typical use of library files**

One will typically create models in the ASCEND system by including one or more of the library files available. Almost certainly the file *atoms.a4l* will become a part of any engineering or scientific model.

It would be useful for you to view this and a few of the other library files using a text editor such as xemacs to see what libraries we do have available.

### **Examples and scripts**

The examples subdirectory in ASCEND has a number of complete ASCEND models. Each model is in two parts: the .a4c file containing the model definition and the .a4s file containing a script which one can use to execute the model. An example is the model *simple\_fs.a4c* along with its script *simple\_fs.a4s*.

Each of the example files indicates which of the library files one must load and the order in which to load them before loading the example file. If you fail to load a library file, you will experience a large number of diagnostic messages indicating there are missing type definitions.