Introduction

Parameters can be attached to curves and are the source for building the y-axis of 3D-plots. Further, Parameters are useful for annotation. After import, Parameter Settings can be edited with the help of the Parameter-Dialog of Vacs.

For 3D-plots, such as contour-graphs, typically the Parameter-Dialog of Vacs opens after import. Beside the editing you also can specify there, which one of the parameters forms the y-axis of the plot. This is said in order to underline that the data-file does not need to specify any axis assignment for the graph to be
produced. The data-file represents data, which simply includes an abscissa, one or multiple ordinates and the parameters.

Parameters accept either a single value or a list of values (see Part 1 > Appendix > Syntax). In case a data-set comprises multiple ordinates, i.e., the data-values are arranged in matrix-form, a Parameter may have the form of a list, where each value corresponds to one of the ordinates. In this scenario we often have the situation that some of the Parameters are identical for all the ordinates. In this case a single value is sufficient and will be reproduced internally by Vacs.

For example, on import of directivity data the distance values and polar angles are often constant whereas the azimuthal angles rotate. The script would look like this:

```
...  
Param_Coord_x1=1
Param_Coord_x2=90
Param_Coord_x3='0, 5, ...
...  
14.71 -0.01403  0.09572 -0.02168  0.03582 ...
29.41  0.03272  0.009872 -0.008613  0.03484 ...
```

Likewise, in a data-file with multiple data-sets you may exploit the inheritance feature of Import Settings. For example, if each data-set forms a frequency response at a different azimuthal angle then it is sufficient to specify `Param_Coord_x1=1` and `Param_Coord_x2=90` once at the top of the data-file and then to repeat only the individual `Param_Coord_x3=` for each data-set. Such a script could look like this:

```
...  
Param_Coord_x1=1
Param_Coord_x2=90

Param_Coord_x3=0
14.71  -0.01403  0.09572
29.41  0.03272  0.009872
...
Param_Coord_x3=5
14.71  -0.02168  0.03582
29.41  -0.008613  0.03484
...
```

**Import Control Settings**

The Parameter Settings form a section and can be recognized by the name-space "Param_..." such as `Param_Coord_x1=`, for example. Parameters are regarded as curve properties and will not alter data-values. Each curve can be assigned a maximum of five parameter-values simultaneously. Typically, not all of them are used and the specification depends on the application at hand. For example, if your curves
represent spectra at certain spatial positions then $Param_Coord_x1$, $Param_Coord_x2$ and $Param_Coord_x3$ would be useful because these are dedicated to coordinates. However, you also may want to provide values to $Param_Drv$ in order to record the level of driving. In another case, a set of impedance spectra may be graphed vs a range of driving currents. In this case the electrical current-values would be assigned to $Param_Drv$, and so on.

### Spatial Positioning Parameters

The first three parameters are reserved for spatial positioning, such as the position of the microphone. The values can be given in Cartesian, spherical or cylindrical coordinates. The type of coordinate system should be indicated with the help of $Param_Coord_Type$=. Distances are in meter, and angles are in Degree by default, unless specified otherwise with the help of $Param_Coord_AngularFormat$=. For example

```
Param_Coord_x1=1  
Param_Coord_x2=90  
Param_Coord_x3='-180,-175,-170,...'  
Param_Coord_Type=Spherical  
Param_Coord_AngularFormat=degree
```

In **Cartesian** coordinates this parameter correspond to the x-axis position. In **spherical** coordinates it corresponds to the distance from the origin. In **cylindrical** coordinates it corresponds to the distance from the axis.

```
Param_Coord_x2 = (Float, Float, ...)
```

In **Cartesian** coordinates this parameter correspond to the y-axis position. In **spherical** coordinates it corresponds to the polar angle $\theta$. In **cylindrical** coordinates it corresponds to the axial angle $\phi$.

```
Param_Coord_x3 = (Float, Float, ...)
```

In **Cartesian** coordinates this parameter correspond to the z-axis position. In **spherical** coordinates it corresponds to the axial (azimuthal) angle $\phi$. In **cylindrical** coordinates it corresponds to the z-position.
Param_Coord_Type = (Cartesian, Spherical, Cylindrical)

Type of coordinate system used for Param_Coord_x1, Param_Coord_x2 and Param_Coord_x3.

Param_Coord_AngularFormat = (degree, radiant, cycles)

Angular format of Param_Coord_x2 and Param_Coord_x3.
The default value is Degree, see Part 1 > Appendix > Syntax > Angular Formats.

**Driving Parameter**

This parameter is practical in order to record the driving level of the system measured or simulated. This can be used simply for annotation, but also in order to provide the source for creating the y-axis of contour plots in Vacs, for example in case you want to plot several functions versus the driving value.

Param_Drv = (Float, Float, ...)

Parameter reserved for driving point values such as voltages, currents, etc.

Param_DrvIsRms = (false, true)

If true then values of Param_Drv are rms-values.

**Omni-Purpose Parameter**

Param_Param is an omni-purpose parameter, such as temperature, indices, etc.

Param_Param is often useful if your data, for example, are spectra at certain spatial positions, say at (x,y,z). In this case it makes often no sense to map one of the coordinate-components to the y-axis of a contour plot. A solution would be to generate an index-list into Param_Param for each point in space and then to map Param_Param to the y-axis of a contour-plot in Vacs.
The Radiation Source Position Parameters are mainly used for the documentation of directivity measurements.

The following vectors need to be both specified. They define the frontal and top direction of the radiating source. These vectors are given in the same coordinates as used for the positioning parameters, i.e. as indicated by `Param_Coord_Type`. The length of the vectors can be arbitrary. However, these two vectors should be (close to) orthogonal, i.e. they should include an angle of 90º.

```
Param_Coord_Top = (Float, Float, ...)
Param_Coord_Front = (Float, Float, ...)
```

For **Cartesian** there are three values corresponding to the x-, y-, z-components.

For **spherical** there are two values to be entered. The first is the polar angle and the second is the axial or azimuthal angle.

For **cylindrical** there are two values: The first is the axial angle and the second is the axial position.

For example

```
... 
Param_Coord_x1=1 
Param_Coord_x2=90 
Param_Coord_x3='0,5,...' 
Param_Coord_Type=Spherical 
... 
Param_Coord_Top='0,0' 
Param_Coord_Front='90,0' 
...
```

In this example the source top-vector points upwards because "0,0" defines the north-pole in spherical coordinates. The front-vector points "on-axis", which is at a position of θ=90º polar and ϕ=0º axial angle.