3.7. CLASSIFICATION AND USE OF IMAGE DATA
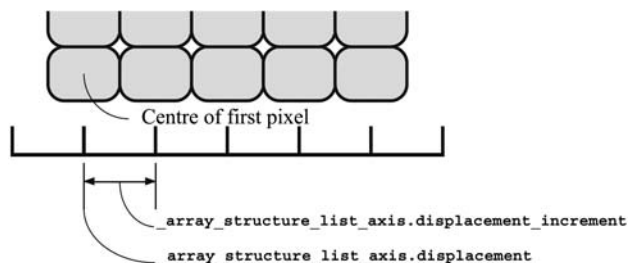

Fig. 3.7.2.1. ARRAY_STRUCTURE_LIST specification of linearly organized image elements.

Fig. 3.7.2.3. ARRAY_STRUCTURE_LIST specification of 'constant-velocity' image elements in a cylindrical scan. The angular and radial axes are coupled. Note that outer-zone image elements are the same linear distance apart, centre-to-centre, as the inner-zone image elements.

Note that a spiral scan uses two coupled axes, one for the angular direction and one for the radial direction. This differs from a cylindrical scan for which the two axes are not coupled into one set.

Multiple related axes are gathered together into sets. Each set is identified by the value of the axis set identifier, `_array_structure_list_axis.axis_set_id`, and each axis within a set is identified by the value of `_array_structure_list_axis.axis_id`. Each set given by a value of `*.axis_set_id` is linked to a corresponding value for `_array_structure_list.axis_set_id` to relate settings of the axes in the axis set to particular image elements in ARRAY_STRUCTURE_LIST.

If axes are all independent, no value need be given for `_array_structure_list_axis.axis_set_id`, which is then implicitly given the corresponding value of `_array_structure_list_axis.axis_id`. Each axis given by a value of `_array_structure_list_axis.axis_id` is linked to a corresponding value for `_axis.id` to provide a physical description of the axis. `_array_structure_list_axis.axis_id` and `_array_structure_list_axis.axis_set_id` together uniquely identify a row of data in an ARRAY_STRUCTURE_LIST_AXIS table.

For the remaining data items, there are two important cases to consider: axes that step by Euclidean distance and axes that step by angle. Fig. 3.7.2.1 shows a portion of an array of image elements laid out on a rectangular grid. The starting point of an axis is specified in millimetres by the value of `_array_`

`structure_list_axis.displacement` and the centre-to-centre distance between pixels is specified in millimetres by the value of `_array_structure_list_axis.displacement_increment`.

Fig. 3.7.2.2 shows a portion of an array of image elements laid out in concentric cylinders. The starting point of the angular axis is specified in degrees by the value of `_array_structure_list_axis.angle` and the centre-to-centre angular distance between pixels is specified in degrees by the value of `_array_structure_list_axis.angle_increment`. The starting point of the radial axis is specified by the value of `_array_structure_list_axis.displacement` and the radial distance between cylinders of pixels is specified in millimetres by the value of `_array_structure_list_axis.radial_pitch`. Note that the image elements further from the centre are larger than the image elements closer to the centre.

Fig. 3.7.2.3 shows a portion of a spiral scan array in which the angular and radial axes are coupled. This example represents a 'constant-velocity' scan, in which the size of the image elements does not depend on the distance from the centre. The starting point of the angular axis is again specified in degrees by the value of `_array_structure_list_axis.angle`, but the centre-to-centre distance between pixels is specified in millimetres by the value of `_array_structure_list_axis.angular_pitch`. The coupled radial axis is handled in much the same way as for the uncoupled radial axis in the cylindrical array.

These examples show some of the more common two-dimensional data structures. By coupling an additional axis not in the plane of the first two, regular three-dimensional arrays of data can be represented without additional tags. The categories in the DIFFRN group allow arrays of data to be associated with frames and thereby with time and/or wavelength. More general data structures, for example ones based on dope vectors or hash tables, would require the definition of additional tags, but any data structure (see Aho *et al.*, 1987) that can be handled by a modern computer should be manageable within this framework.
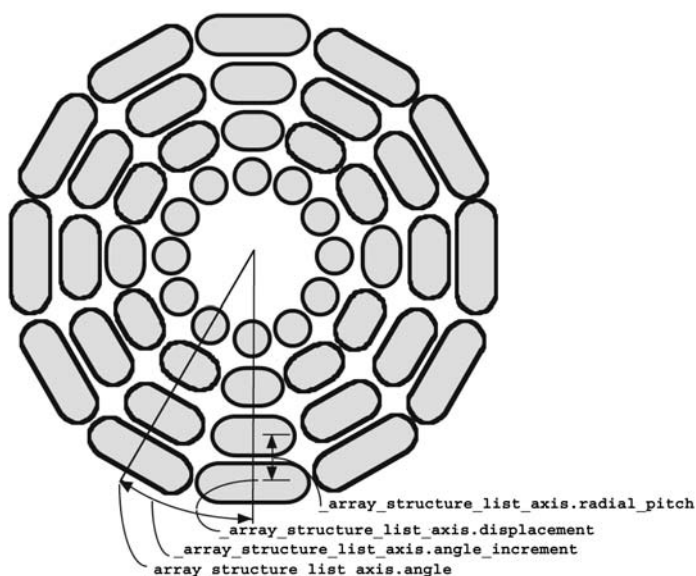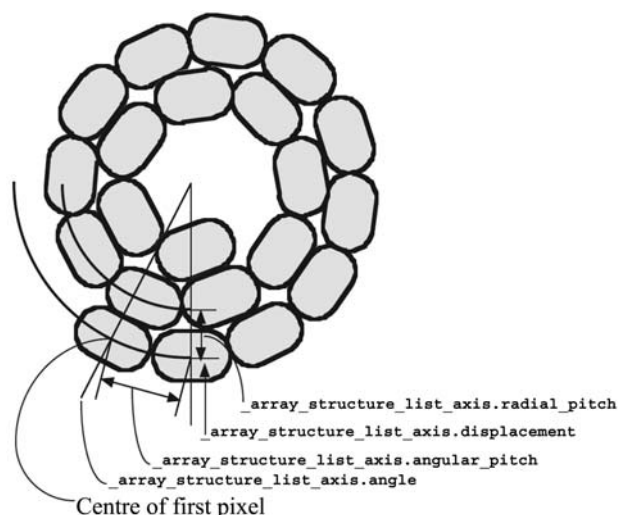

Fig. 3.7.2.2. ARRAY_STRUCTURE_LIST specification of 'constant-angle' image elements in a cylindrical scan. The angular and radial axes are independent. Note that outer-zone image elements are further apart, centre-to-centre, than inner-zone image elements.

3.7.3. Axes

The category describing the axes required to specify the data collection is as follows:

AXIS group

    AXIS

references