

VAMUCH Conventions

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- I. Conventions for 1D Unit Cells

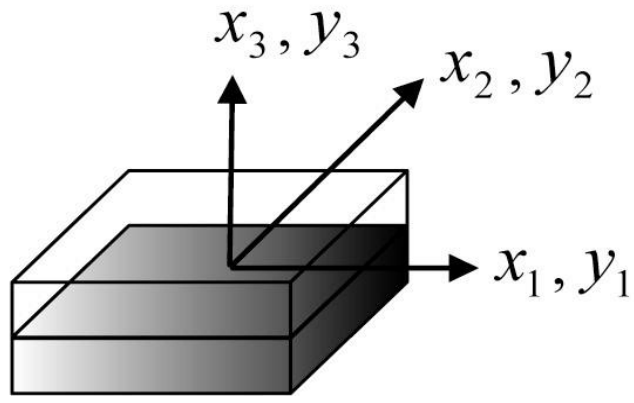


Fig.1 Sketch of 1D UC. The material is uniform along y_1 - y_2 plane, and periodic along y_3 direction. The origin of the y_3 is at the geometry center of the unit cell. Please note VAMUCH could handle arbitrary number of phases.

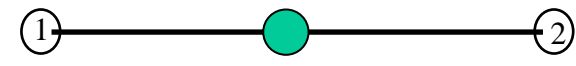


Fig.2 Two-node line element (Green circles denote the 1 point integration scheme)

- II. Conventions for 2D Unit Cells

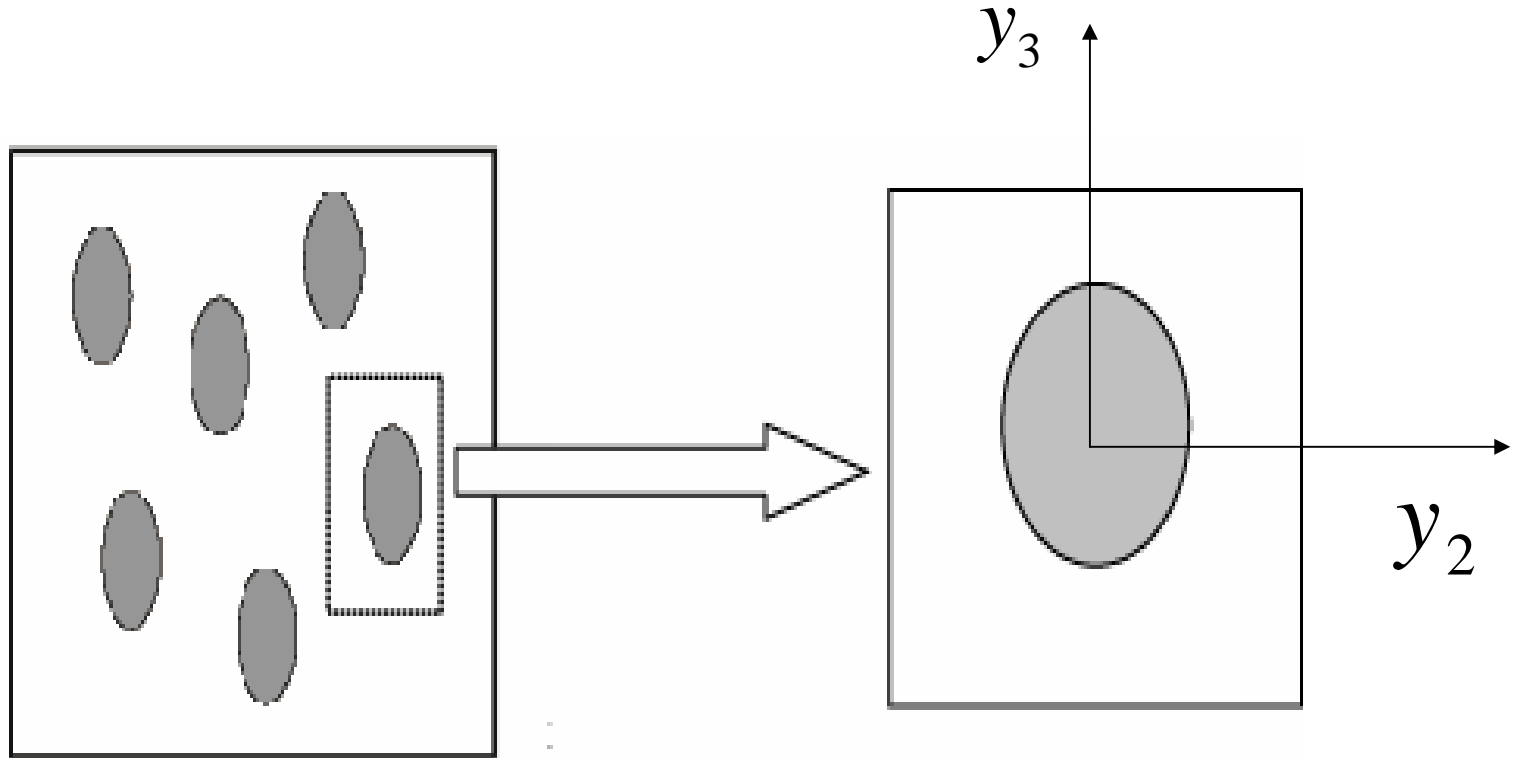


Fig.3 Sketch of 2D UC. The material is uniform along y_1 direction, and periodic in y_2 - y_3 plane. The origin of the coordinate is at the geometry center of the unit cell. Please note VAMUCH could handle arbitrary number of phases.

- III. Conventions for 2D Quadrilateral Elements

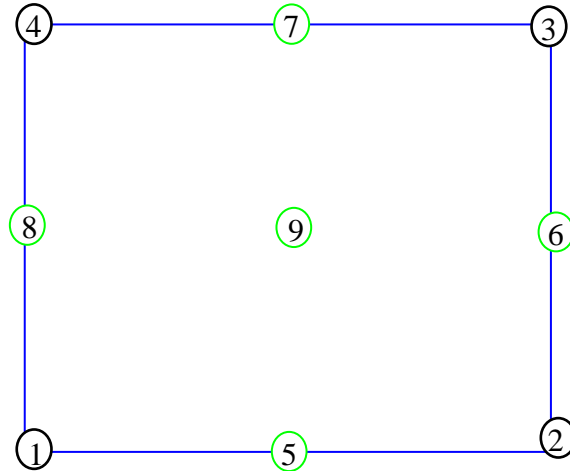


Fig.4 Node numbering (quadratic elements could have all the 9 nodes, linear elements only have the 4 corner nodes, nodes 5-9 are optional). The elemental connectivity is arranged as: 1 2 3 4 5 6 7 8 9 If a node does not exist, fill the position with zero.

- IV. Conventions for 2D Triangular Elements

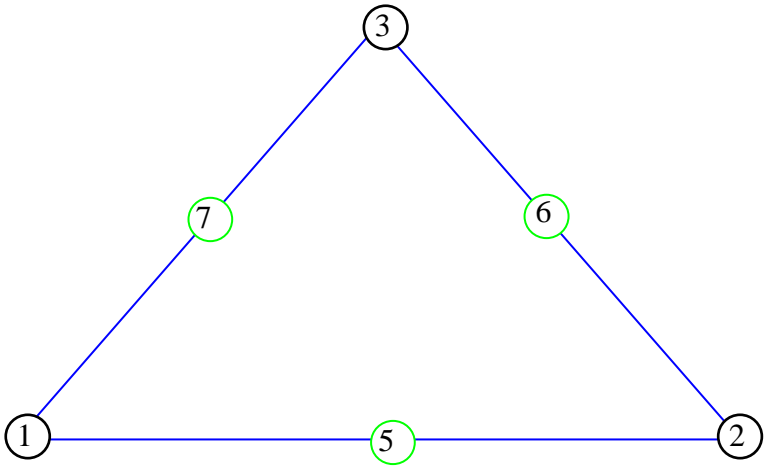


Fig.6 Node numbering (quadratic elements could have all the 7 nodes, linear elements only have the 3 corner nodes, nodes 5-7 are optional. Node 4 is reserved for indicating whether it is a triangular element.) The elemental connectivity is arranged as: 1 2 3 0 5 6 7 0 0. If a node does not exist, fill the position with zero.

- V. Conventions for 3D Unit Cells

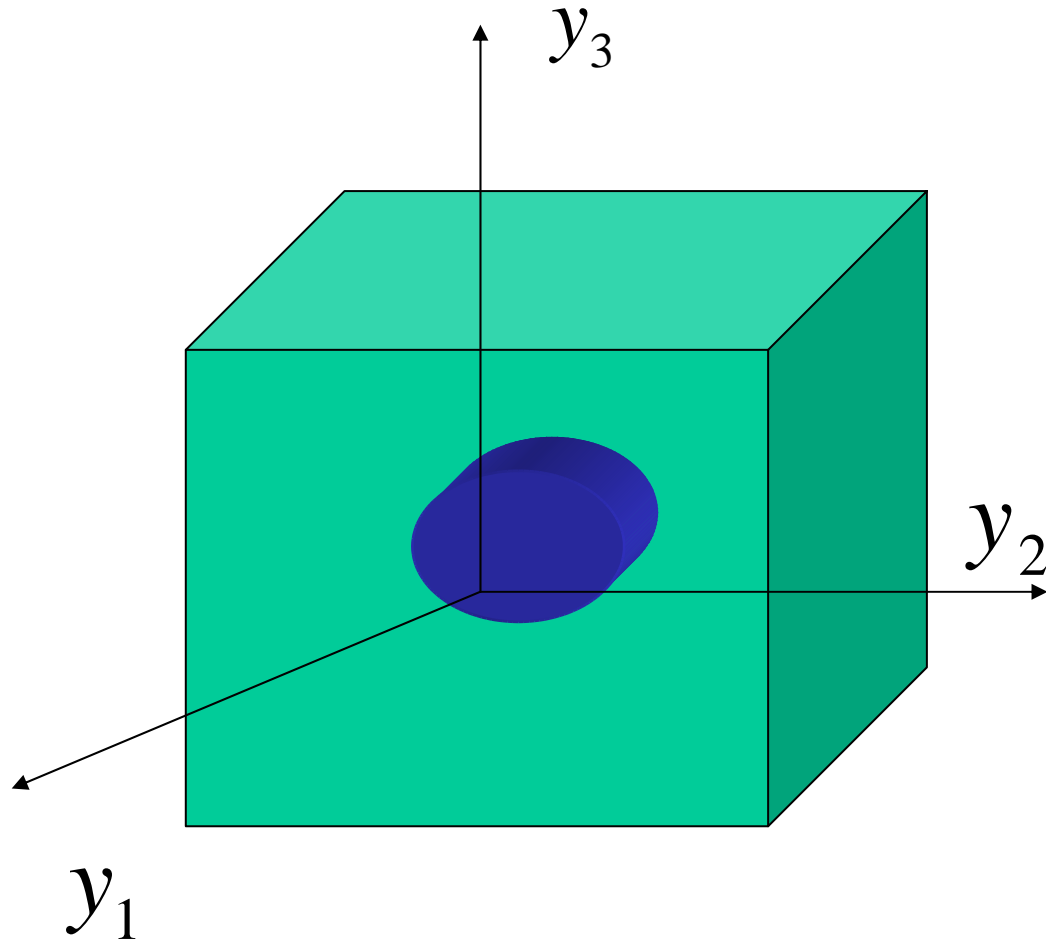


Fig. 8 Sketch of 3D unit cell. The only requirement is that the origin of the coordinate system is at the geometry center of the unit cell. Please note VAMUCH could handle arbitrary number of phases.

- VI. Conventions for Brick Elements

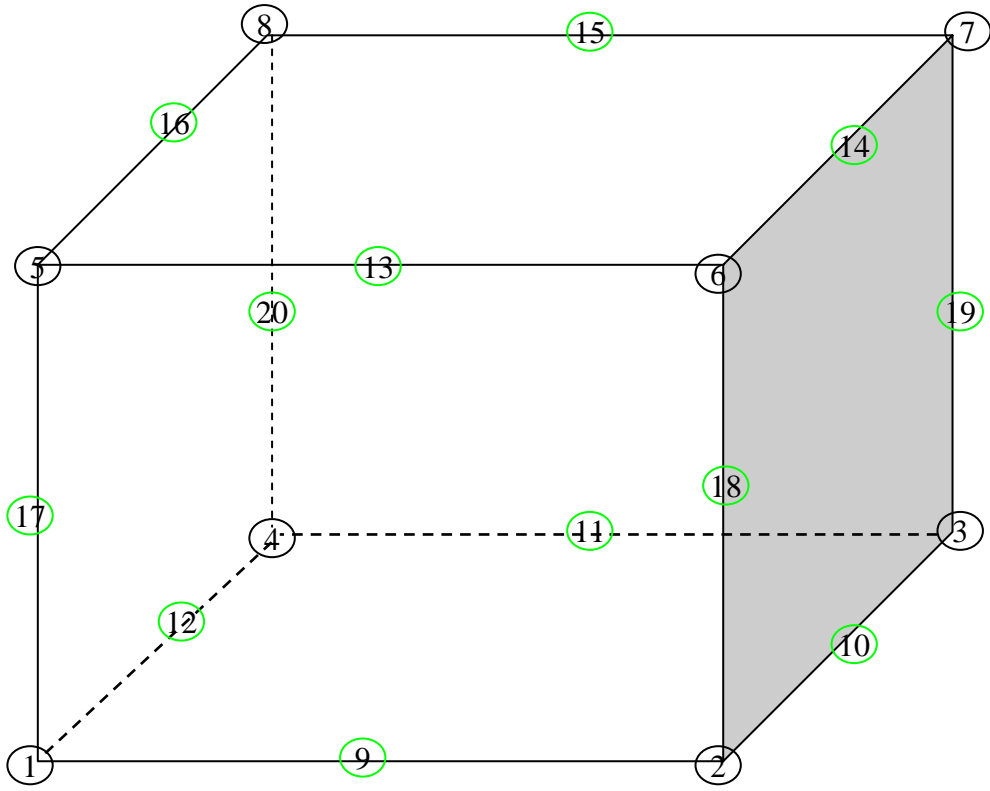


Fig. 9 Node numbering (quadratic elements could have all the 20 nodes, linear elements only have the 8 corner nodes, nodes 9-20 are optional.) The elemental connectivity is arranged as: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20. If a node does not exist, fill the position with zero.

- VII. Conventions for Tetrahedral Elements

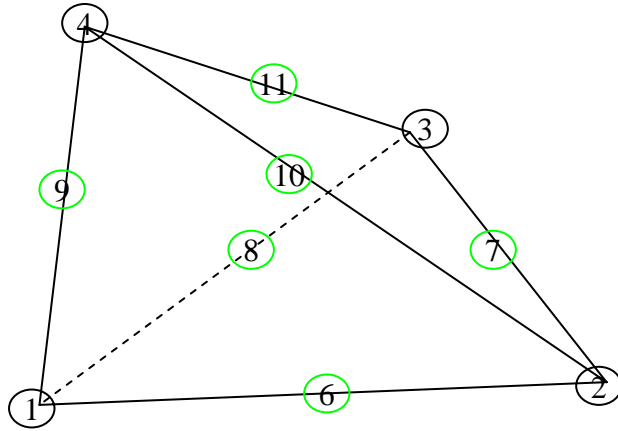


Fig. 10 Node numbering (quadratic elements could have all the 10 nodes, linear elements only have the 4 corner nodes, nodes 6-11 are optional. Node 5 is reserved for indicating whether it is a tetrahedral element.) The elemental connectivity is arranged as: 1 2 3 4 0 6 7 8 9 10 11 0 0 0 0 0 0 0 0 0 0. If a node does not exist, fill the position with zero.