Three-dimensional simulations of the cell growth and cytokinesis using an immersed boundary method[1] YIBAO LI, JUNG-IL CHOI, Dept. CSE, Yonsei University — For an animal cell, cytokinesis is the process by which a cell divides its cytoplasm to produce two daughter cells. We present a three-dimensional immersed boundary method for the simulation of cell growth and cytokinesis. The proposed model is robust and realistic in deciding the position of the cleavage furrow and in defining the contractile force leading to cell division. For accurate calculations, a simple surface re-meshing algorithm is applied to uniformalize distorted meshes. In addition, to keep the mass conservation of the numerical solution at each time step, we use the volume-preserving scheme (Li et al., 2013). We investigate the effects of each model parameter on the cell growth and cytokinesis, and compare numerical results with the experimental data to demonstrate the efficiency and accuracy of the proposed method.

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