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Deformations of the cell cytoplasm through the lens of poro-viscoelastic materials CALINA COPOS, University of North Carolina Chapel Hill, ROBERT GUY, University of California Davis — The cell cytoplasm is the largest part of the cell by volume and its rheological properties dictate the material response of the whole cell. In particular, the cytoskeleton behaves like a porous elastic solid on timescales of seconds, but a viscous fluid on timescales longer than minutes. On intermediate timescales, the actin network behaves like an elastic material that exhibits stress relaxation due to the reorganization of the cytoskeleton. We consider a poroelastic immersed boundary method in which a fluid permeates a porous, elastic structure of negligible volume fraction. Then, we extend this method to describe a poro-viscoelastic material in a computationally efficient way, and thus include stress relaxation of the material. Lastly, we demonstrate how this computational method can be used, together with fast cytometry measurements, to infer material properties of the cell.

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