Electronic Supplementary Material (ESI) for Soft Matter

Supplementary Material for "**Elastic nanomembrane metrology at fluid/fluid interfaces using axisymmetric drop shape analysis with anisotropic surface tensions: deviations from Young-Laplace equation**" by James K. Ferri et al.

Isotropic Interfacial tension and Flat Disc Membrane.

Figure S1 compares the shapes calculated by equations (2) and (3), the Young-Laplace equation, and equations (5) and (6), the anisotropic surface stress equations, which are identical.

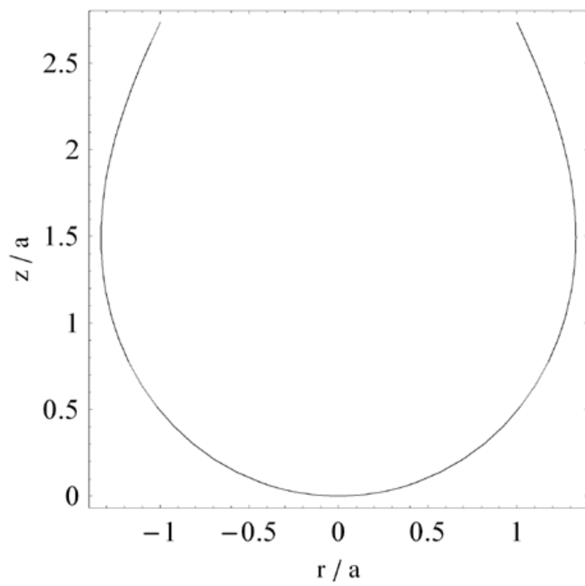

Figure S1. No deformation; linear elastic interface equation (4a). $\lambda_1=\lambda_2=1$; G_s=100 mN/m; ν_s=0; R_0=1320 m^{-1}; $\Delta\rho$ =997 kg m^{-3}; $\gamma(\Gamma)$=50 mN/m.

Linear elastic nanomembranes at axisymmetric fluid/fluid interfaces: effect of surface shear modulus on surface deformation.

From Figure S2, it is seen that the meridional stretching (λ_1) is maximum at the drop apex and that as the surface shear modulus increases, non-monotonic behavior develops in (λ_2). However, in all cases, the magnitude of the stretches is similar.

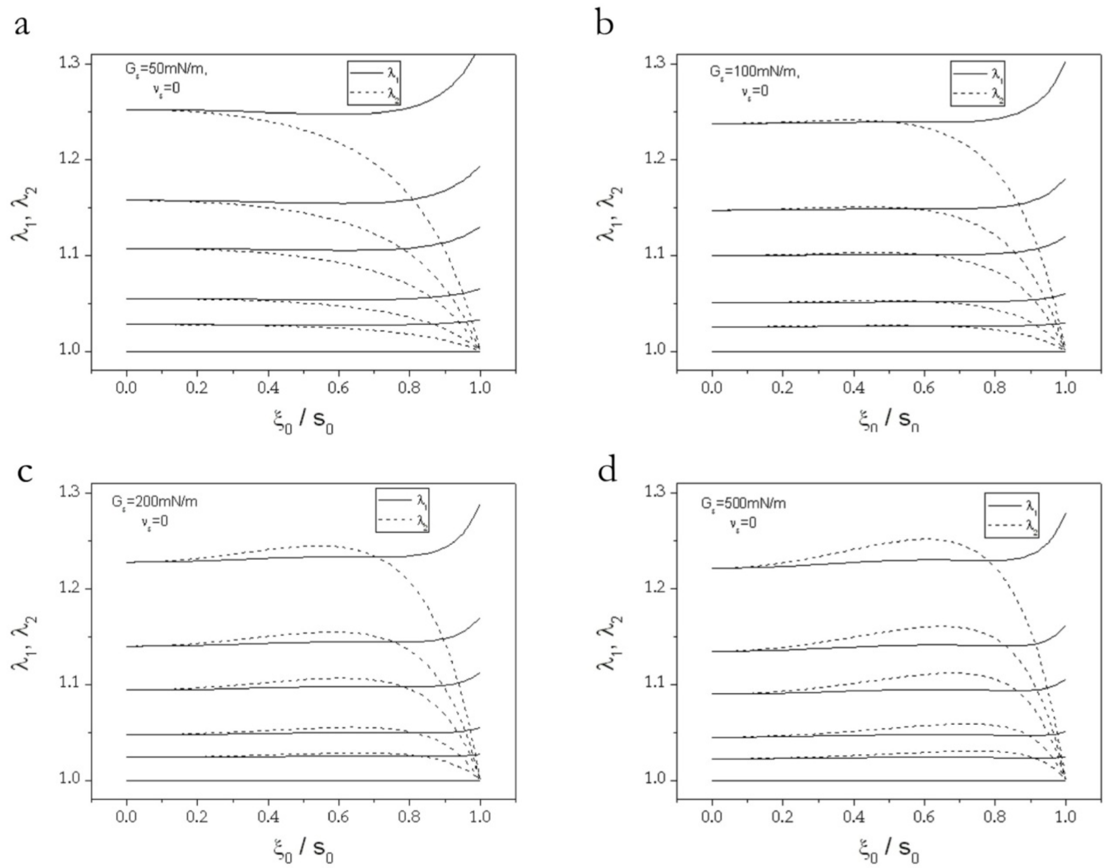

Figure S2. Effect of surface shear modulus on principal stretches, λ_1 (—) and λ_2 (---): G_s = (a) 50, (b) 100, (c) 200, (d) 500 mN/m, ν_s = 0; for all calculations α=0, 0.1, 0.2, 0.3, 0.4 and 0.5. R_0 = 1320 m^{-1}, $\Delta\rho$ = 997 kgm^{-3}, $\gamma(T)$ = 50 mN/m.

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Shape differences between surfaces with anisotropic stresses and the Young-Laplace equation.

Figure S3 shows the sum of the radial error as a function of inflation for different surface Poisson ratios. The figure confirms that the error, which results from using the Young-Laplace equation to describe an anisotropic surface, increases with increasing incompressibility (i.e. a greater value of ν_s). Although these errors are small in magnitude, it is clear that they are systematic, demonstrating the inherent deviations between the Young-Laplace equation and the case of anisotropic stress distributions.

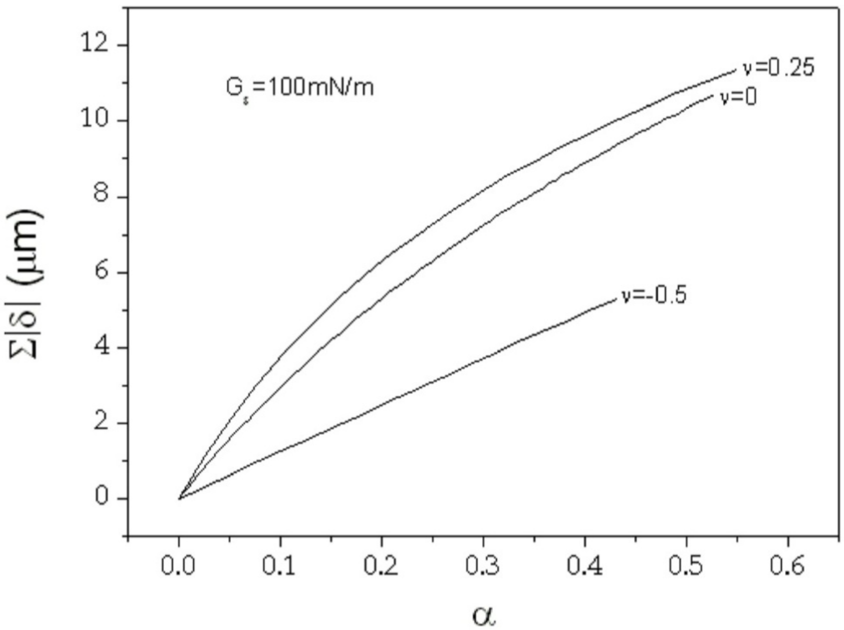

Figure S3. Sum of Young-Laplace error as a function of the surface Poisson ratio of the membrane, ν_s; G_s = 100 mN/m, ν_s = -0.5, 0, 0.25.