

Figure 1

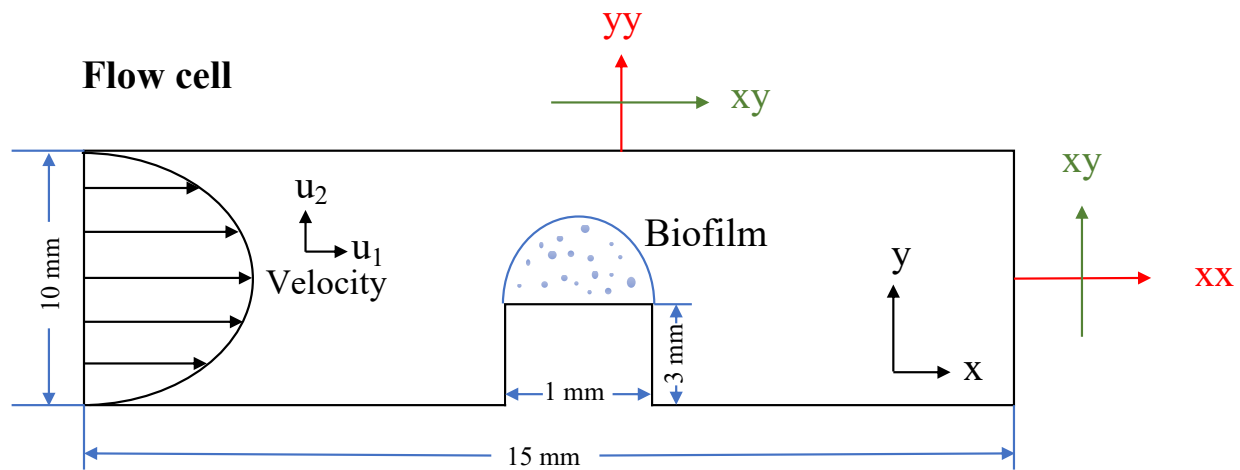


Fig. 1. Schematic indicating the coordinate system and modeling dimensions in the flow cell. The schematic is not to scale.

Figure 2

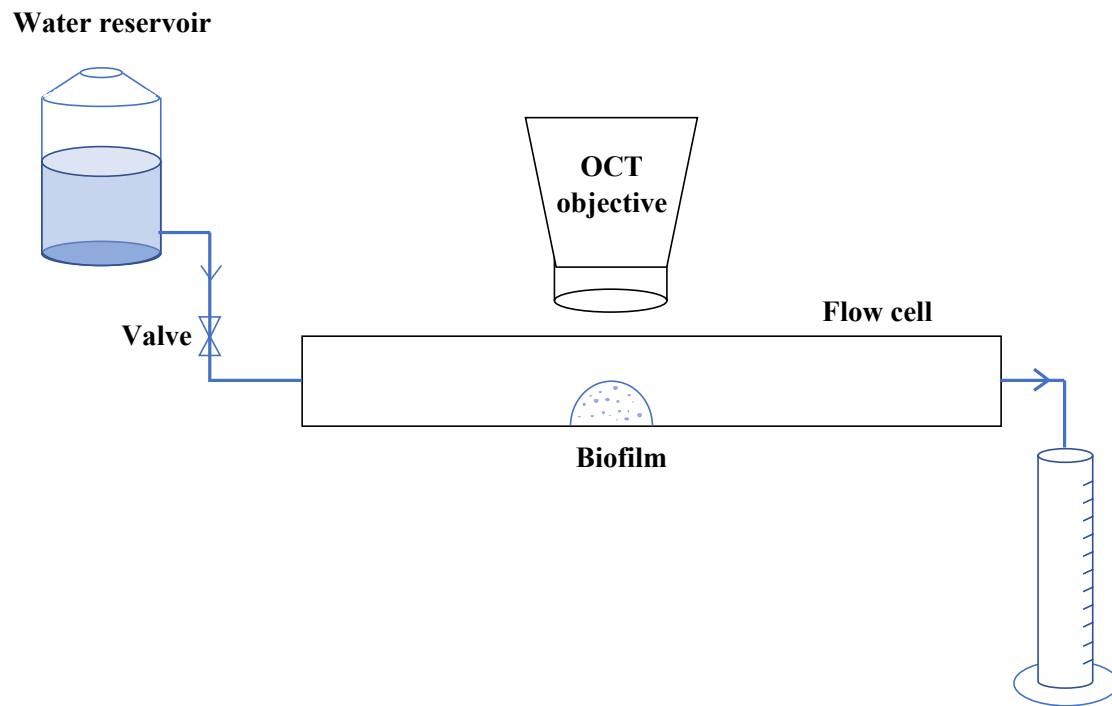


Fig. 2. Schematic of experimental set up, including biofilm flow cell and OCT unit. The flow was driven by gravity.

Figure 3

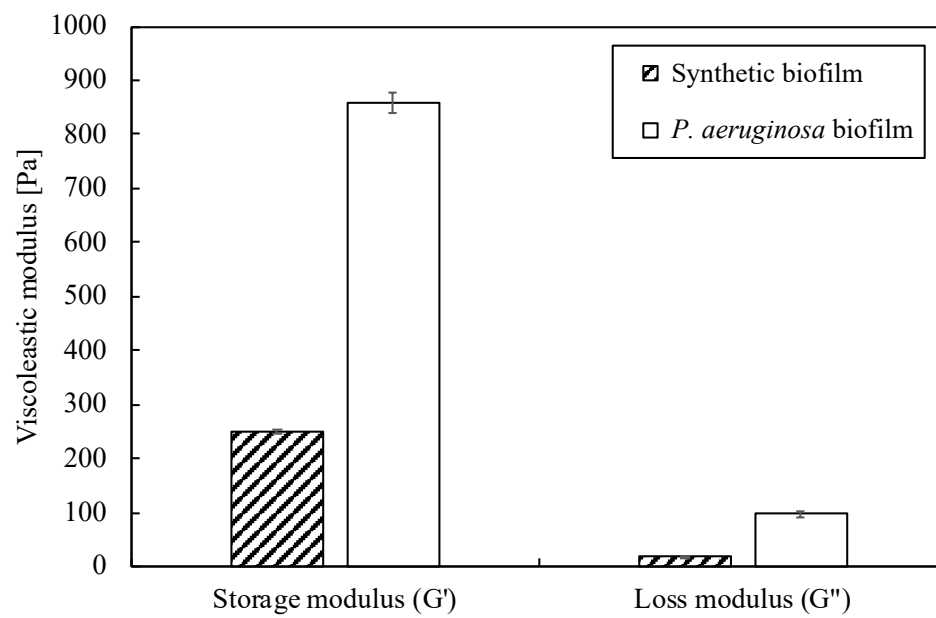


Fig. 3. Averaged viscoelastic moduli for synthetic biofilm and homogenized *P. aeruginosa* biofilm. The error bars show standard deviations from 3 replicates.

Figure 4

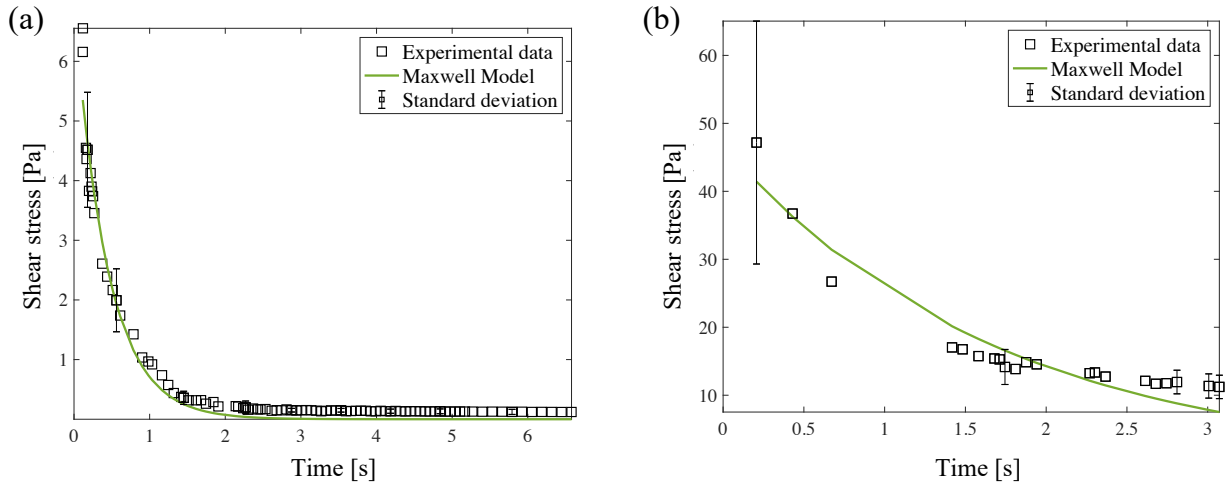


Fig. 4. Rheometer data and fitted Maxwell model for (a) synthetic biofilm, and (b) homogenized biofilm.

The synthetic biofilm was tested under a constant strain of 0.01% and the homogenized biofilm was under 0.1% of strain. The black square markers indicate the averaged measured shear stress over time. The error bars indicate one standard deviation, based on the 10 replicates. The green line shows the fitted Maxwell model.

Figure 5

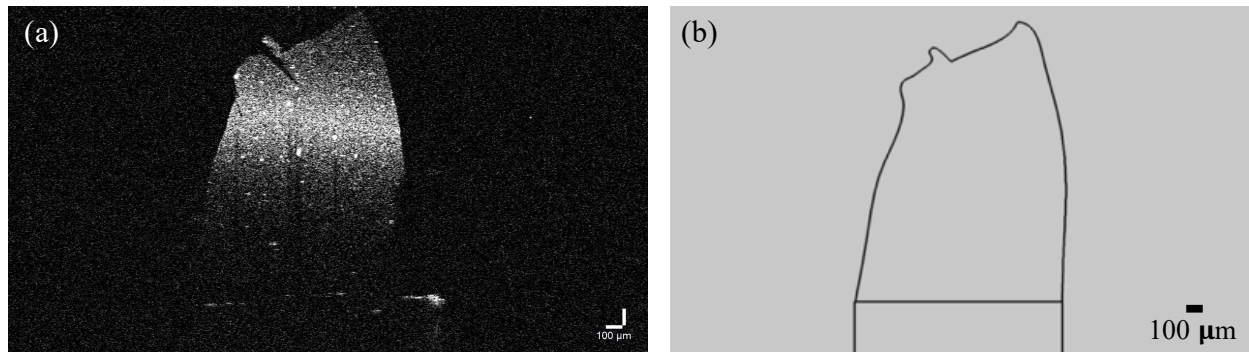


Fig. 5. Biofilm geometries in the experiment and model. (a) Cross-sectional OCT image of synthetic biofilm; (b) modeling geometry based on the OCT image.

Figure 6

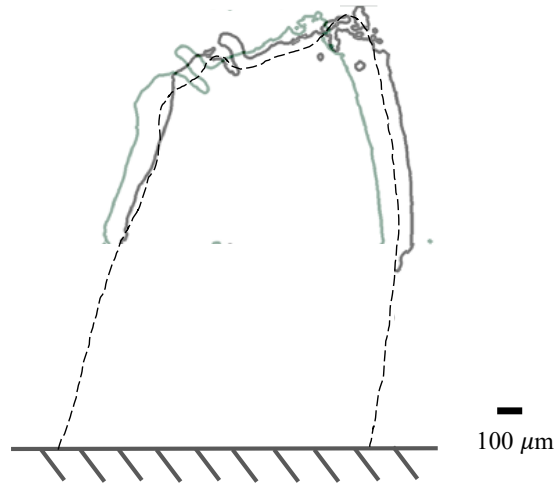


Fig. 6. The comparison of synthetic biofilm boundaries. Flow was from left to right. Green line: biofilm contour at $t=0$ (in experiment and computational model); black line: biofilm contour at $t=20$ s (in experiment); black dashed line: biofilm contour at $t=20$ s (in computational model). Unrelated data were filtered out.

Figure 7

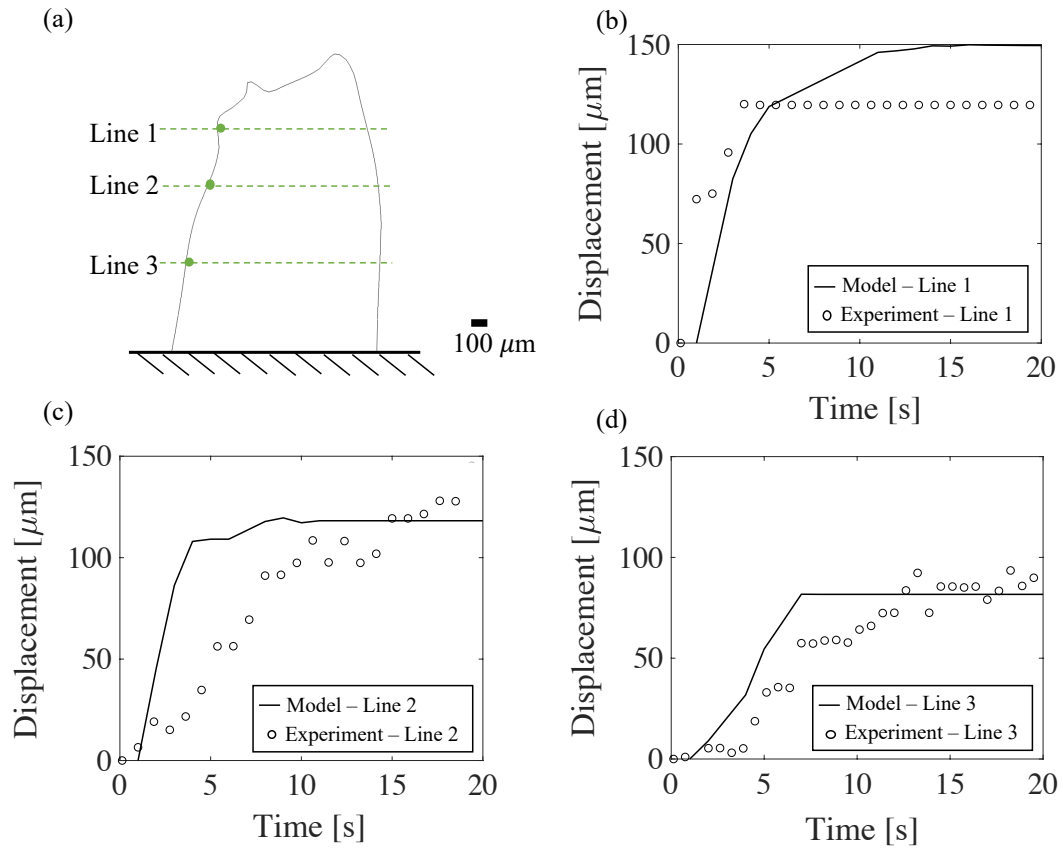


Fig. 7. (a) Locations of measurement (lines 1-3) for DIC analysis. (b)-(d) Experimental and modeling displacement of synthetic biofilm along lines 1-3.

Figure 8

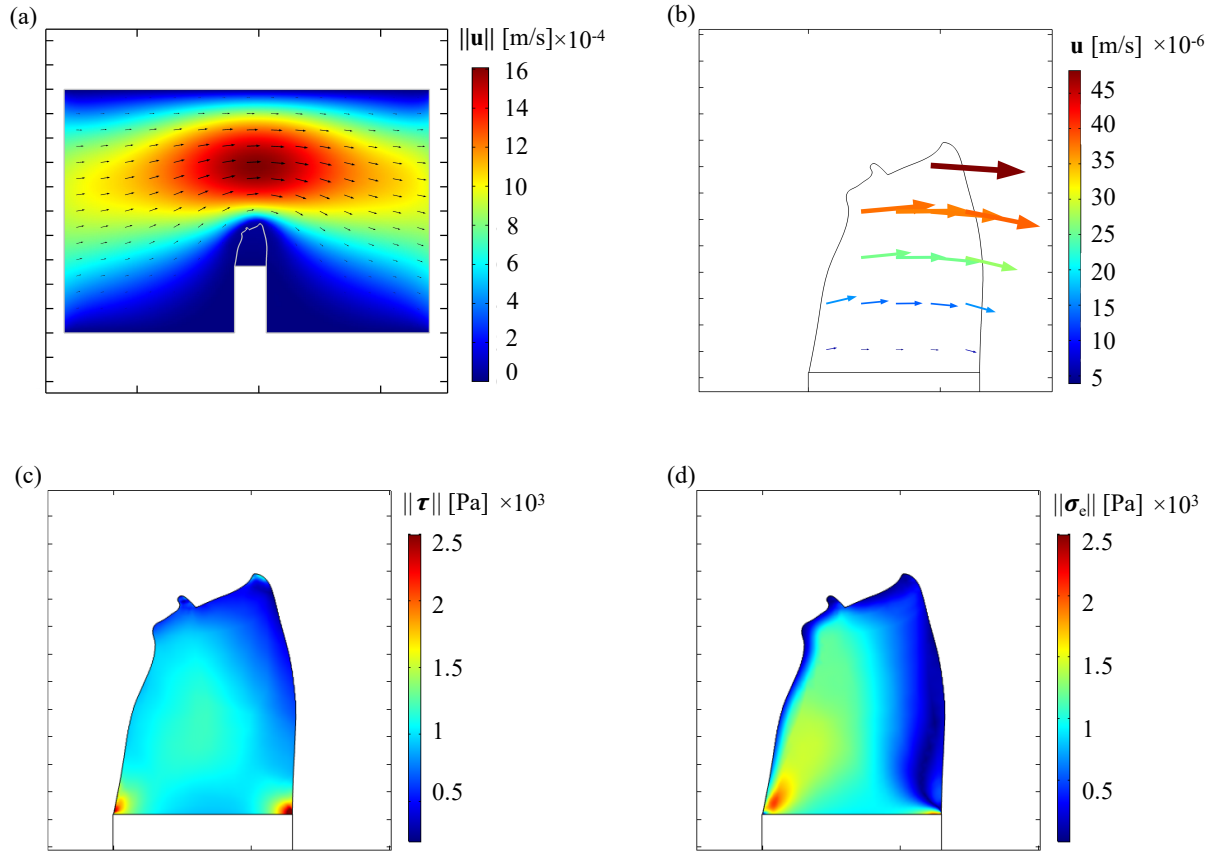


Fig. 8. Simulated velocity \mathbf{u} and stress distribution for synthetic biofilm at $t=2$ s. (a) Velocity field of solvent domain (colored surface and black arrows); (b) velocity field of synthetic biofilm domain (colored arrows); (c) the magnitude of viscous stress tensor $\|\boldsymbol{\tau}\|$ on synthetic biofilm domain; (d) the magnitude of elastic components of the deviatoric stress tensor $\|\boldsymbol{\sigma}_e\|$ on synthetic biofilm domain.

Figure 9

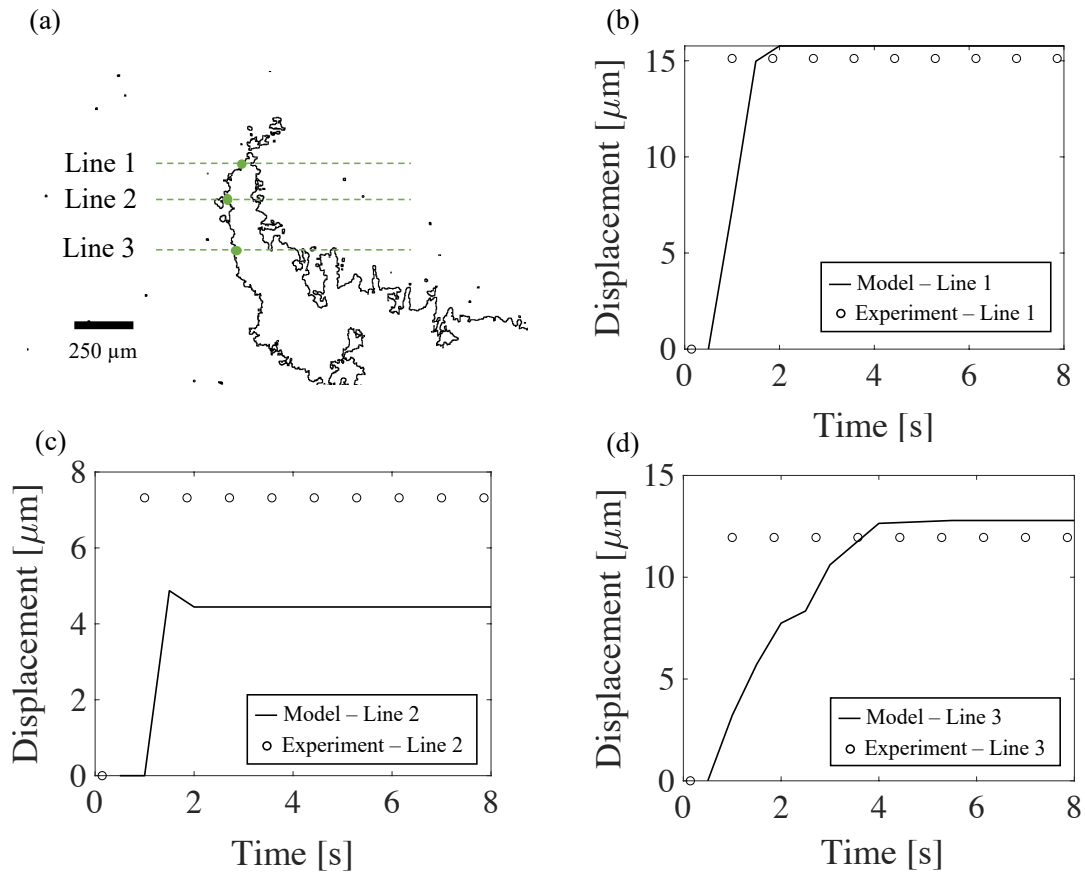


Fig. 9. (a) Locations of measurement (lines 1-3) for DIC analysis. (b)-(d) Experimental and modeling displacement of *P.aeruginosa* biofilm along lines 1-3.