Biofilm spread on surfaces

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Recent experiments of Bacillus subtilis biofilm spread on surfaces suggest that their structure is defined by the interplay of elastic deformations and liquid transport within the biofilm, in response to the cellular activity and the interaction with the surrounding environment. We propose a poroelastic model for biofilm spread on agar surfaces [1]. The motion of the boundaries can be described by the combined use of Von Kármán type approximations for the agar/biofilm interface and thin film approximations for the biofilm/air interface. Bacterial activity informs the macroscopic continuous model through source terms and residual stresses, either phenomenological or derived from microscopic models [4, 5]. Numerical simulations show that the model captures observed qualitative behavior such as accelerated spread and wrinkle formation [4, 2, 3].

References

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