

# Using a form-finding model to analyze the effect of actin bundles on the stiffness of a cytoskeleton network

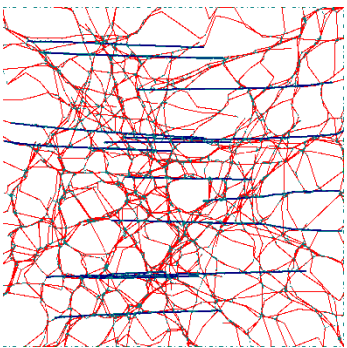
**Key words:** Cytoskeleton network, Form-finding model, Elastic modulus, Actin bundles

Cite this as: Bao-long Li, Yi-fan Wang, Jing-hai Gong, 2014. Using a form-finding model to analyze the effect of actin bundles on the stiffness of a cytoskeleton network. *Journal of Zhejiang University-SCIENCE A (Applied Physics & Engineering)*, 15(9):732-742. [doi:10.1631/jzus.A13b0287]

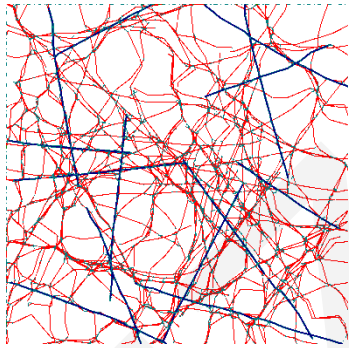
# Research Summary

This paper mainly investigated the stiffness of cytoskeleton networks consisting of actin filaments and bundles using a computational model based on form-finding analysis.

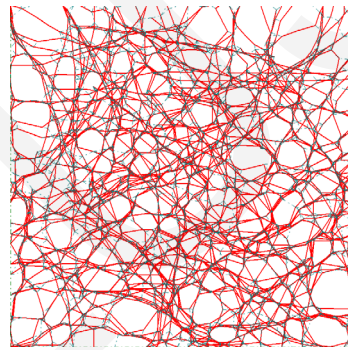
Three aspects that affect the stiffness of cytoskeleton networks have been studied:



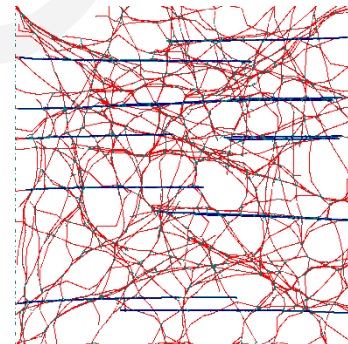
(a) Bundles in parallel



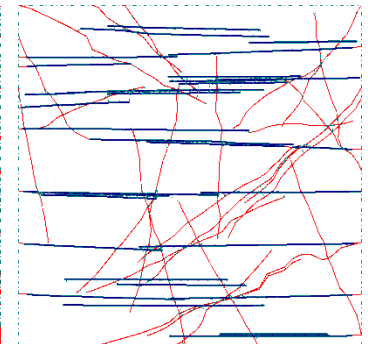
(b) Bundles in disorder



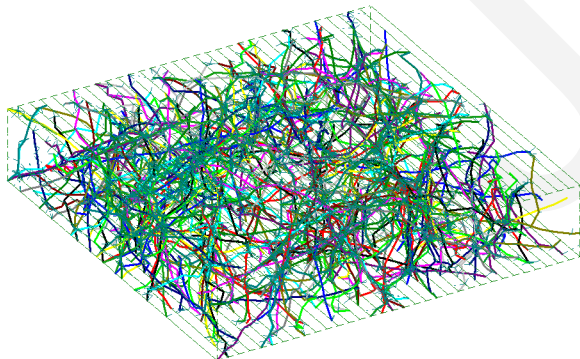
(a) 0%



(b) 40%



(c) 90%

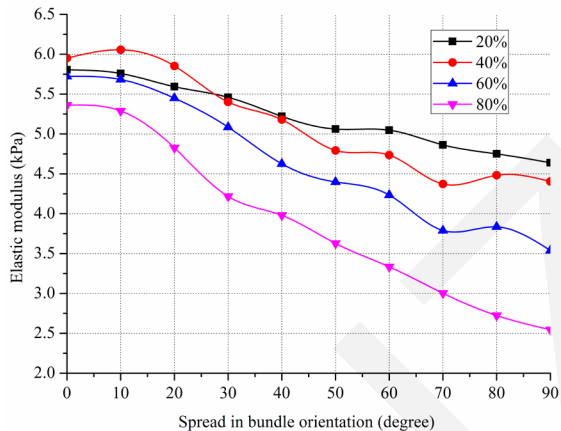


A 3D form-finding model

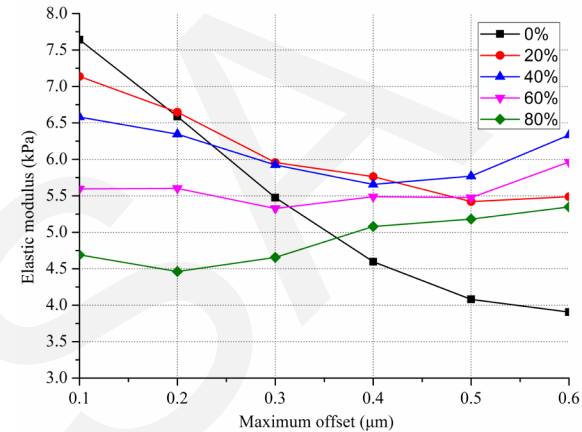
- The spread in bundle orientation
- Filament undulations
- Relative density of bundles

# main conclusions

- **Filament undulations can soften the network by increasing the amount of bending-dominated deformations in the model.**



- **with a constant amount of actin filament material, the stiffest network contains both actin filaments and bundles.**



- **Parallel bundles along the stretching direction can significantly enhance the network stiffness, while bundles distributed randomly make no contribution to the stiffness.**

