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Modeling Project
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Introduction

In Lecture 12, the polarization of the stem cell cytoskeleton as a function of the stiffness of ECM is considered. A number of characteristics of cell/ECM interaction, such as the modeling-predicted order parameter [1] (Fig.1) or experiment-estimated myosin fiber intensity [1] (Fig.2) demonstrate an increase saturation pattern as functions of ECM stiffness. Use the 1-D model where the cell and ECM are presented by the active and elastic springs, respectively [1] (Fig.3) and show that the active force generated by the cell, f_a, as a function of the ECM stiffness, has the same increase saturation pattern of behavior.

References

[1] Assaf Zemel, Florian Rehfeldt, Alexander E.X. Brown, Dennis E. Discher, and Samuel A. Safran. Optimal matrix rigidity for stress-fibre polarization in stem cells. *Nature Physics*, 6(6):468–473, 2010.