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Buckling of Branched Cytoskeletal Filaments D.A. QUINT, J.M. SCHWARZ, Syracuse University — *In vitro* experiments of growing dendritic actin networks demonstrate reversible stress-softening at high loads, above some critical load. The transition to the stress-softening regime has been attributed to the elastic buckling of individual actin filaments. To estimate the critical load above which softening should occur, we extend the elastic theory of buckling of individual filaments embedded in a network to include the buckling of branched filaments, a signature trait of growing dendritic actin networks. Under certain assumptions, there will be approximately a seven-fold increase in the classical critical bucking load, when compared to the unbranched filament, which is entirely due to the presence of a branch. Moreover, we go beyond the classical buckling regime to investigate the effect of entropic fluctuations. The result of compressing the filament in this case leads to an increase in these fluctuations and eventually the harmonic approximation breaks down signifying the onset of the buckling transition. We compute corrections to the classical critical buckling load near this breakdown.

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