MATHEMATICAL MODELLING OF CELL ADHESION FORCES : FROM DELAY TO FRICTION, FROM GLOBAL TO LOCAL EXISTENCE

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In this talk we present the starting mechanical model of the lamellipodial actin-cytoskeleton meshwork. The model is derived starting from the microscopic description of mechanical properties of filaments and cross-links and also of the life-cycle of cross-linker molecules [1, 5, 4]. We introduce a simplified system of equations that accounts for adhesions created by a single point on which we apply a force. We present the adimensionalisation that led to a singular limit motivating our mathematical study. Then we explain the mathematical setting and results already published [1, 2]. In the last part we present the latest developments : we give results for the fully coupled system with unbounded non-linear off-rates [3]. This leads to two possible regimes : under certain hypotheses on the data there is global existence, out of this range we are able to prove blow-up in finite time.

References

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