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Supporting Material

Stochastic Simulation of Signal Transduction: Impact of the Cellular Architecture on Diffusion

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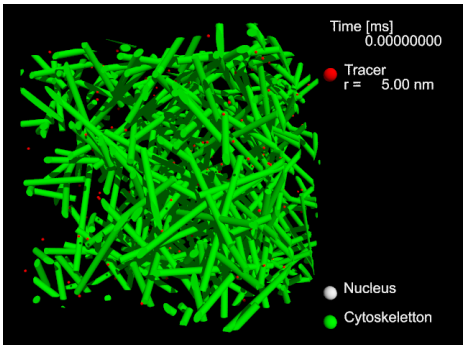
Supplemental Material: Simulation Parameters and Results

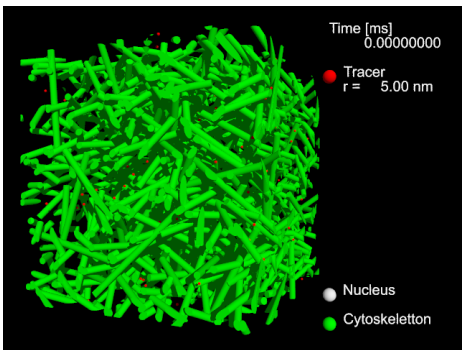


Cytoskeleton Volume Fraction 0.0505

Filament Properties
Radius = 12.5 nm
Lenght = 500 nm
Number = 720

Simulation Box Size
Length = 1000 nm

r_{tracer}[nm]	Δx[nm]	Δt[μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.0505	0.9621	0.0047
2.5	4.3301	3.1250	0.0724	0.9450	0.0038
5.0	5.0518	4.2434	0.0984	0.9289	0.0072
7.5	5.7735	5.5556	0.1275	0.9077	0.0034
10.0	6.4952	7.0313	0.1603	0.8831	0.0043
12.5	7.2169	8.6806	0.1957	0.8580	0.0012
15.0	7.9386	10.5035	0.2332	0.8218	0.0038
17.5	8.6603	12.5000	0.2727	0.7891	0.0035
20.0	9.3819	14.6701	0.3145	0.7566	0.0021
22.5	10.1036	17.0139	0.3583	0.7230	0.0061
25.0	10.8253	19.5313	0.4007	0.6832	0.0035
27.5	11.5470	22.2222	0.4446	0.6444	0.0011
30.0	12.2687	25.0868	0.4881	0.6007	0.0030

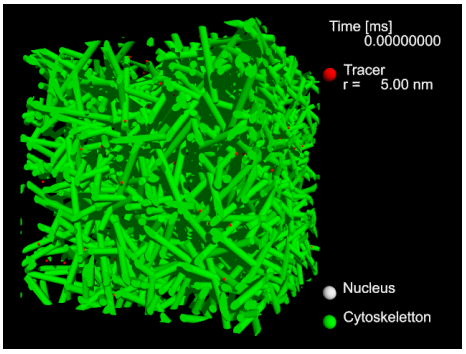


Cytoskeleton Volume Fraction 0.0997

Filament Properties
Radius = 12.5 nm
Lenght = 500 nm
Number = 1470

Simulation Box Size
Length = 1000 nm

r_{tracer}[nm]	Δx [nm]	Δt [μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.0997	0.9245	0.0077
2.5	4.3301	3.1250	0.1418	0.8991	0.0046
5.0	5.0518	4.2434	0.1901	0.8562	0.0050
7.5	5.7735	5.5556	0.2419	0.8190	0.0029
10.0	6.4952	7.0313	0.2982	0.7732	0.0024
12.5	7.2169	8.6806	0.3569	0.7225	0.0027
15.0	7.9386	10.5035	0.4175	0.6660	0.0031
17.5	8.6603	12.5000	0.4772	0.6126	0.0015
20.0	9.3819	14.6701	0.5362	0.5507	0.0031
22.5	10.1036	17.0139	0.5941	0.4848	0.0017
25.0	10.8253	19.5313	0.6490	0.4174	0.0017
27.5	11.5470	22.2222	0.6988	0.3534	0.0019
30.0	12.2687	25.0868	0.7462	0.2918	0.0015

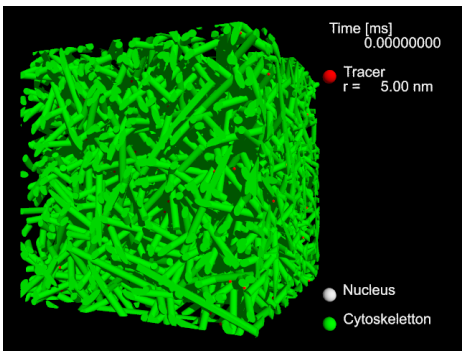


Cytoskeleton Volume Fraction 0.1514

Filament Properties
Radius = 12.5 nm
Lenght = 500 nm
Number = 2055

Simulation Box Size
Length = 1000 nm

r_{tracer}[nm]	Δx [nm]	Δt [μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.1514	0.8885	0.0045
2.5	4.3301	3.1250	0.2132	0.8428	0.0030
5.0	5.0518	4.2434	0.2804	0.7884	0.0036
7.5	5.7735	5.5556	0.3518	0.7245	0.0048
10.0	6.4952	7.0313	0.4247	0.6540	0.0018
12.5	7.2169	8.6806	0.4986	0.5796	0.0025
15.0	7.9386	10.5035	0.5693	0.5022	0.0030
17.5	8.6603	12.5000	0.6372	0.4159	0.0010
20.0	9.3819	14.6701	0.6995	0.3305	0.0018
22.5	10.1036	17.0139	0.7554	0.2480	0.0007
25.0	10.8253	19.5313	0.8038	0.1733	0.0033
27.5	11.5470	22.2222	0.8461	0.1075	0.0009
30.0	12.2687	25.0868	0.8812	0.0518	0.0040

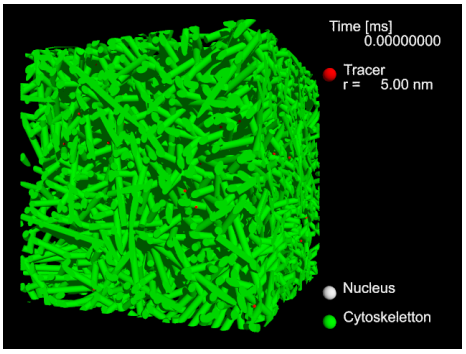


Cytoskeleton Volume Fraction 0.1989

Filament Properties
Radius = 12.5 nm
Lenght = 500 nm
Number = 3165

Simulation Box Size
Length = 1000 nm

r_{tracer}[nm]	Δx [nm]	Δt [μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.1989	0.8444	0.0109
2.5	4.3301	3.1250	0.2757	0.7844	0.0041
5.0	5.0518	4.2434	0.3585	0.7141	0.0028
7.5	5.7735	5.5556	0.4437	0.6400	0.0010
10.0	6.4952	7.0313	0.5274	0.5486	0.0036
12.5	7.2169	8.6806	0.6066	0.4586	0.0027
15.0	7.9386	10.5035	0.6790	0.3680	0.0021
17.5	8.6603	12.5000	0.7446	0.2783	0.0011
20.0	9.3819	14.6701	0.8006	0.1931	0.0008
22.5	10.1036	17.0139	0.8485	0.1187	0.0025
25.0	10.8253	19.5313	0.8874	0.0626	0.0059
27.5	11.5470	22.2222	0.9182	0.0187	0.0010
30.0	12.2687	25.0868	0.9419	0.0020	0.0005

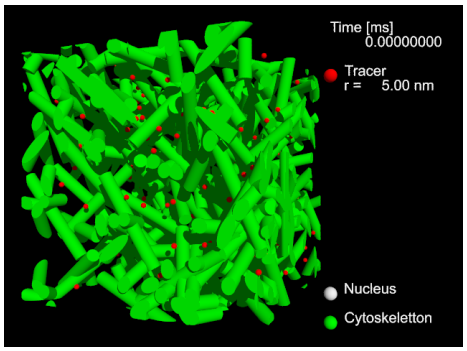


Cytoskeleton Volume Fraction 0.2491

Filament Properties
Radius = 12.5 nm
Lenght = 500 nm
Number = 4095

Simulation Box Size
Length = 1000 nm

r_{tracer}[nm]	Δx [nm]	Δt [μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.2491	0.8120	0.0106
2.5	4.3301	3.1250	0.3402	0.7346	0.0031
5.0	5.0518	4.2434	0.4366	0.6445	0.0040
7.5	5.7735	5.5556	0.5314	0.5462	0.0015
10.0	6.4952	7.0313	0.6214	0.4459	0.0018
12.5	7.2169	8.6806	0.7032	0.3409	0.0011
15.0	7.9386	10.5035	0.7735	0.2418	0.0018
17.5	8.6603	12.5000	0.8328	0.1495	0.0009
20.0	9.3819	14.6701	0.8805	0.0767	0.0012
22.5	10.1036	17.0139	0.9172	0.0269	0.0005
25.0	10.8253	19.5313	0.9448	0.0048	0.0002
27.5	11.5470	22.2222	0.9644	0.0001	0.0000
30.0	12.2687	25.0868	0.9779	0.0000	0.0000

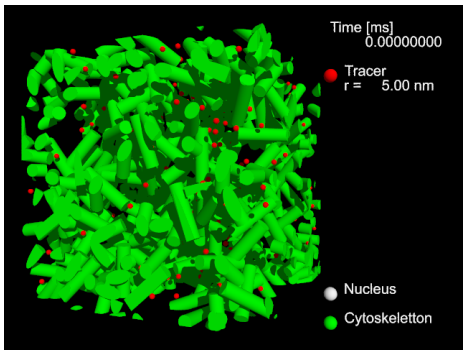


Cytoskeleton Volume Fraction 0.1497

Filament Properties
Radius = 12.5 nm
Lenght = 200 nm
Number = 555

Simulation Box Size
Length = 500 nm

r_{tracer}[nm]	Δx[nm]	Δt[μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.1497	0.8906	0.0079
2.5	4.3301	3.1250	0.2118	0.8414	0.0027
5.0	5.0518	4.2434	0.2821	0.7839	0.0042
7.5	5.7735	5.5556	0.3565	0.7181	0.0027
10.0	6.4952	7.0313	0.4349	0.6493	0.0038
12.5	7.2169	8.6806	0.5116	0.5687	0.0035
15.0	7.9386	10.5035	0.5880	0.4881	0.0027
17.5	8.6603	12.5000	0.6589	0.4081	0.0032
20.0	9.3819	14.6701	0.7239	0.3198	0.0018
22.5	10.1036	17.0139	0.7826	0.2377	0.0036
25.0	10.8253	19.5313	0.8332	0.1563	0.0034
27.5	11.5470	22.2222	0.8755	0.0859	0.0018
30.0	12.2687	25.0868	0.9098	0.0315	0.0027

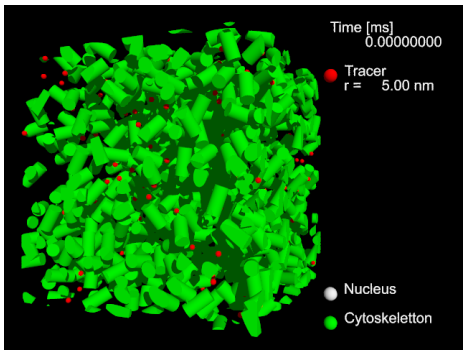


Cytoskeleton Volume Fraction 0.1505

Filament Properties
Radius = 12.5 nm
Lenght = 100 nm
Number = 720

Simulation Box Size
Length = 500 nm

r_{tracer}[nm]	Δx[nm]	Δt[μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.1505	0.8933	0.0034
2.5	4.3301	3.1250	0.2196	0.8446	0.0042
5.0	5.0518	4.2434	0.2978	0.7837	0.0024
7.5	5.7735	5.5556	0.3846	0.7100	0.0046
10.0	6.4952	7.0313	0.4736	0.6305	0.0030
12.5	7.2169	8.6806	0.5621	0.5386	0.0022
15.0	7.9386	10.5035	0.6450	0.4473	0.0017
17.5	8.6603	12.5000	0.7208	0.3577	0.0025
20.0	9.3819	14.6701	0.7879	0.2626	0.0034
22.5	10.1036	17.0139	0.8441	0.1649	0.0013
25.0	10.8253	19.5313	0.8895	0.0876	0.0029
27.5	11.5470	22.2222	0.9247	0.0407	0.0024
30.0	12.2687	25.0868	0.9513	0.0063	0.0022

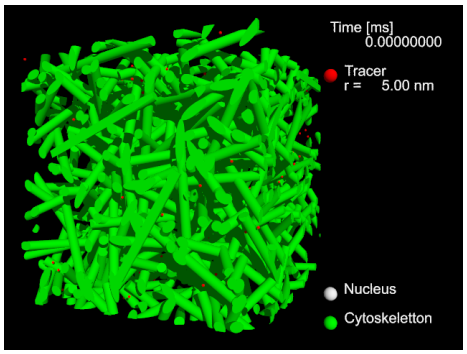


Cytoskeleton Volume Fraction 0.1493

Filament Properties
Radius = 12.5 nm
Lenght = 50 nm
Number = 1110

Simulation Box Size
Length = 500 nm

r_{tracer}[nm]	Δx[nm]	Δt[μs]	ε	D_{eff}/D_0	SD
0.0	3.6084	2.1701	0.1493	0.9046	0.0048
2.5	4.3301	3.1250	0.2256	0.8467	0.0040
5.0	5.0518	4.2434	0.3165	0.7800	0.0040
7.5	5.7735	5.5556	0.4173	0.6949	0.0037
10.0	6.4952	7.0313	0.5193	0.5947	0.0031
12.5	7.2169	8.6806	0.6195	0.4814	0.0038
15.0	7.9386	10.5035	0.7108	0.3712	0.0020
17.5	8.6603	12.5000	0.7897	0.2589	0.0018
20.0	9.3819	14.6701	0.8539	0.1678	0.0061
22.5	10.1036	17.0139	0.9036	0.0879	0.0034
25.0	10.8253	19.5313	0.9402	0.0276	0.0018
27.5	11.5470	22.2222	0.9649	0.0002	0.0000
30.0	12.2687	25.0868	0.9808	0.0000	0.0000

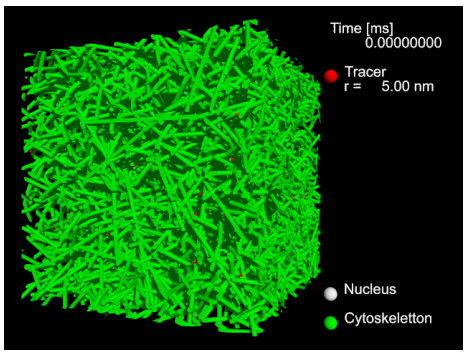


Cytoskeleton Volume Fraction 0.1508

Filament Properties
Radius = 17.5 nm
Lenght = 500 nm
Number = 1095

Simulation Box Size
Length = 1000 nm

r_{tracer}[nm]	Δx[nm]	Δt[μs]	ε	D_{eff}/D_0	SD
0.0	5.0518	4.2535	0.1508	0.8903	0.0051
2.5	5.7735	5.5556	0.1939	0.8550	0.0028
5.0	6.4952	7.0313	0.2407	0.8236	0.0063
7.5	7.2169	8.6806	0.2902	0.7769	0.0072
10.0	7.9386	10.5035	0.3427	0.7350	0.0055
12.5	8.6603	12.5000	0.3958	0.6872	0.0028
15.0	9.3819	14.6701	0.4501	0.6356	0.0034
17.5	10.1036	17.0139	0.5025	0.5816	0.0039
20.0	10.8253	19.5313	0.5548	0.5239	0.0018
22.5	11.5470	22.2222	0.6056	0.4621	0.0023
25.0	12.2687	25.0868	0.6533	0.4002	0.0036
27.5	12.9904	28.1250	0.6986	0.3352	0.0023
30.0	13.7121	31.3368	0.7398	0.2814	0.0025



Cytoskeleton Volume Fraction 0.1490

Filament Properties
Radius = 7.5 nm
Lenght = 500 nm
Number = 6090

Simulation Box Size
Length = 1000 nm

r_{tracer}[nm]	Δx[nm]	Δt[μs]	ε	D_{eff}/D_0	SD
0.0	2.1651	0.7813	0.1490	0.8920	0.0147
2.5	2.8868	1.3889	0.2516	0.8052	0.0060
5.0	3.6084	2.1701	0.3661	0.7088	0.0046
7.5	4.3301	3.1250	0.4854	0.5923	0.0032
10.0	5.0518	4.2535	0.5981	0.4686	0.0035
12.5	5.7735	5.5556	0.6989	0.3442	0.0043
15.0	6.4952	7.0313	0.7846	0.2236	0.0016
17.5	7.2169	8.6806	0.8526	0.1204	0.0007
20.0	7.9386	10.5035	0.9032	0.0430	0.0008
22.5	8.6603	12.5000	0.9401	0.0065	0.0002
25.0	Test particles do not fit into the spaces of the network …				
27.5	Test particles do not fit into the spaces of the network …				
30.0	Test particles do not fit into the spaces of the network …				

$\Delta x = 0.5 \cdot (r_{fiber} + r_{tracer}) / \sqrt{3}$; $\Delta t = \Delta x^2 / (6 D_0)$ based on Eq. 2, $D_0 = 1$ μm²/s; ε = excluded volume fraction