Summary of Results

We compare the differences in parameter optimization for different time lengths using Shirley Ma's data (folder 100714 Animal cap x0.8 Scion x2_0).

In the figures below, the blue dotted curves are the experimental edges and the red solid lines are the edges simulated from the model. The optimal parameters using the Full length of the movies (all 120 frames), First Half of the movies (frames 1-60), and Second Half of the movies (frames 61-120) are recorded for four explants of differing sizes.

Simulations of the Full length, First Half length, and Second Half length are run using the three sets of parameters. As expected, the parameters optimized for the time length in question result in the smallest least squares error comparing the experimental and simulated densities and edges.

For parameter ratio F/k, the value for the Full time length is the largest for all simulations. The First Half is the next largest for all simulations except Pos10 exp2.

For parameter ratio k/b, the value for the Second Half time length is the largest for all simulations, then the First Half time length, then the Full time length.

Assuming stretching modulus k is fixed, this means that lamellipodia force F and adhesion constant b is largest when simulating the Full time length. Comparing the First and Second Half time lengths, adhesion constant b is larger in the First Half and lamellipodia force F is generally larger in the First Half.

Also, adding the errors from the First Half (with parameters optimized for the First Half) and Second Half (with parameters optimized for the Second Half) is smaller than the error from the Full time length (with parameters optimized for the Full time length) for every simulation.

This might imply that the lamellipodia force and adhesion decreases over time in an explant of any size. It is unclear from this test whether there are distinct time periods where the parameters are relatively constant or if the parameters change continuously over time.

Pos0

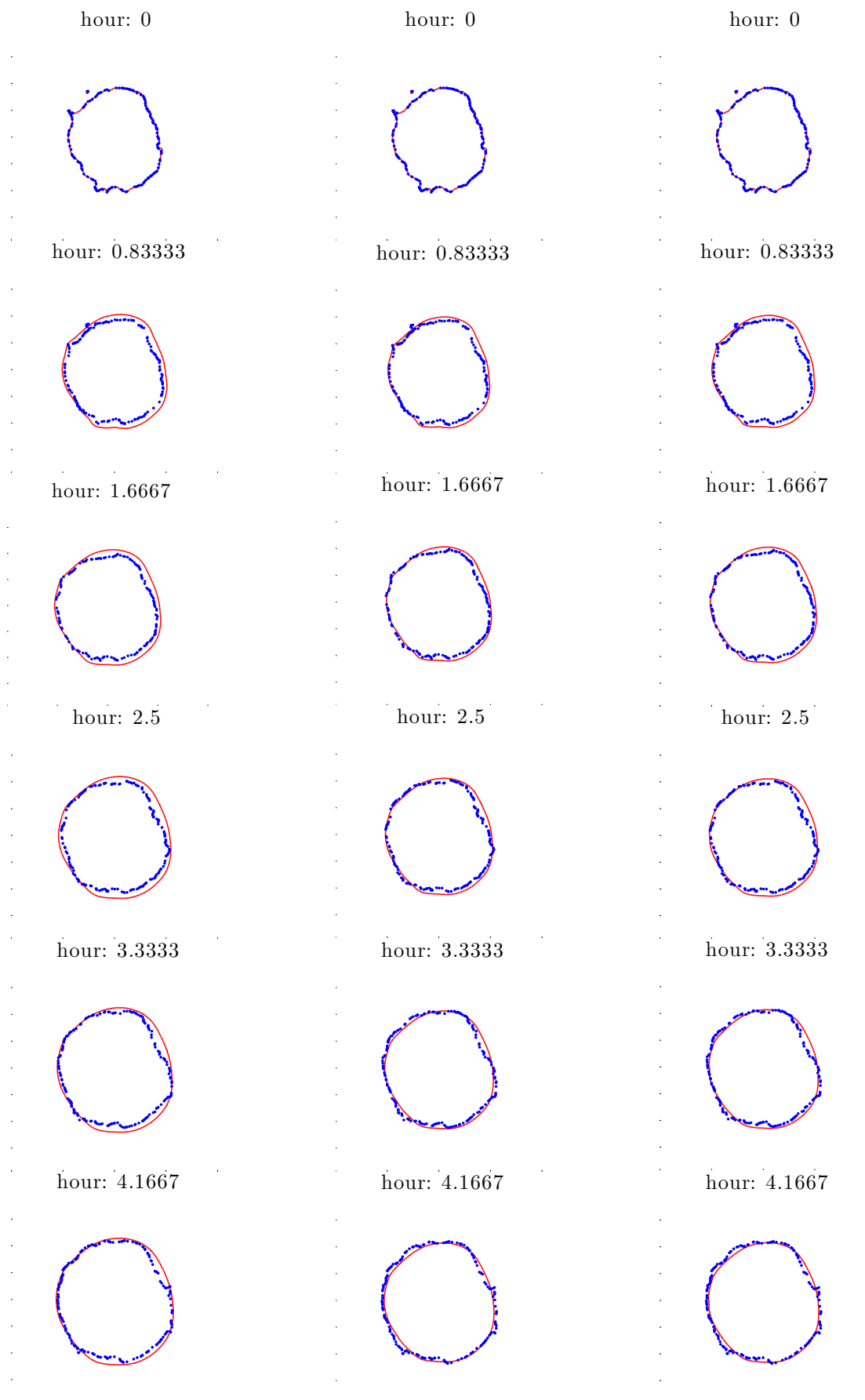| Time Length	Estimated F/k	Estimated k/b
Full	0.7297636264	35831.8930896767
First Half	0.4191547711	69684.3169052193
Second Half	0.4079956055	95961.795806886
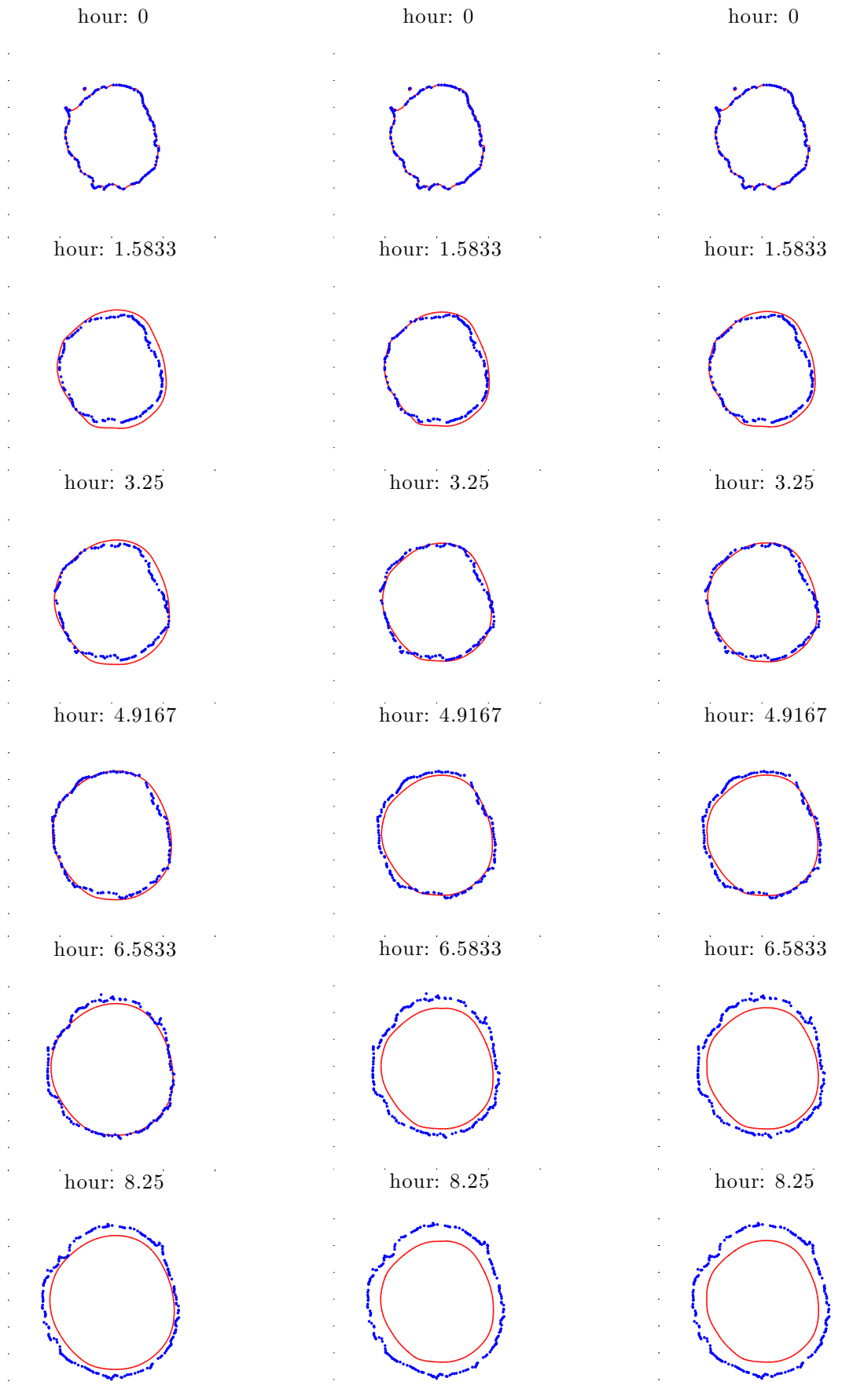
(a) **Full** parameters:
error 4188997.12169454

(b) **First Half** parameters:
error 4385995.22528114

(c) **Second Half** parameters:
error 4393693.52587609

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Pos0: Simulating the **First Half** time length (frames 1-60)

hour: 0   hour: 0   hour: 0

hour: 0.83333   hour: 0.83333   hour: 0.83333

hour: 1.6667   hour: 1.6667   hour: 1.6667

hour: 2.5   hour: 2.5   hour: 2.5

hour: 3.3333   hour: 3.3333   hour: 3.3333

hour: 4.1667   hour: 4.1667   hour: 4.1667

(a) **Full** parameters: (b) **First Half** parameters: (c) **Second Half** parameters:
error 1324725.47344136   error 1230368.12968762   error 1243092.11017805

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Pos0: Simulating the **Second Half** time length (frames 61-120) [*hour 0 should be hour 5*]
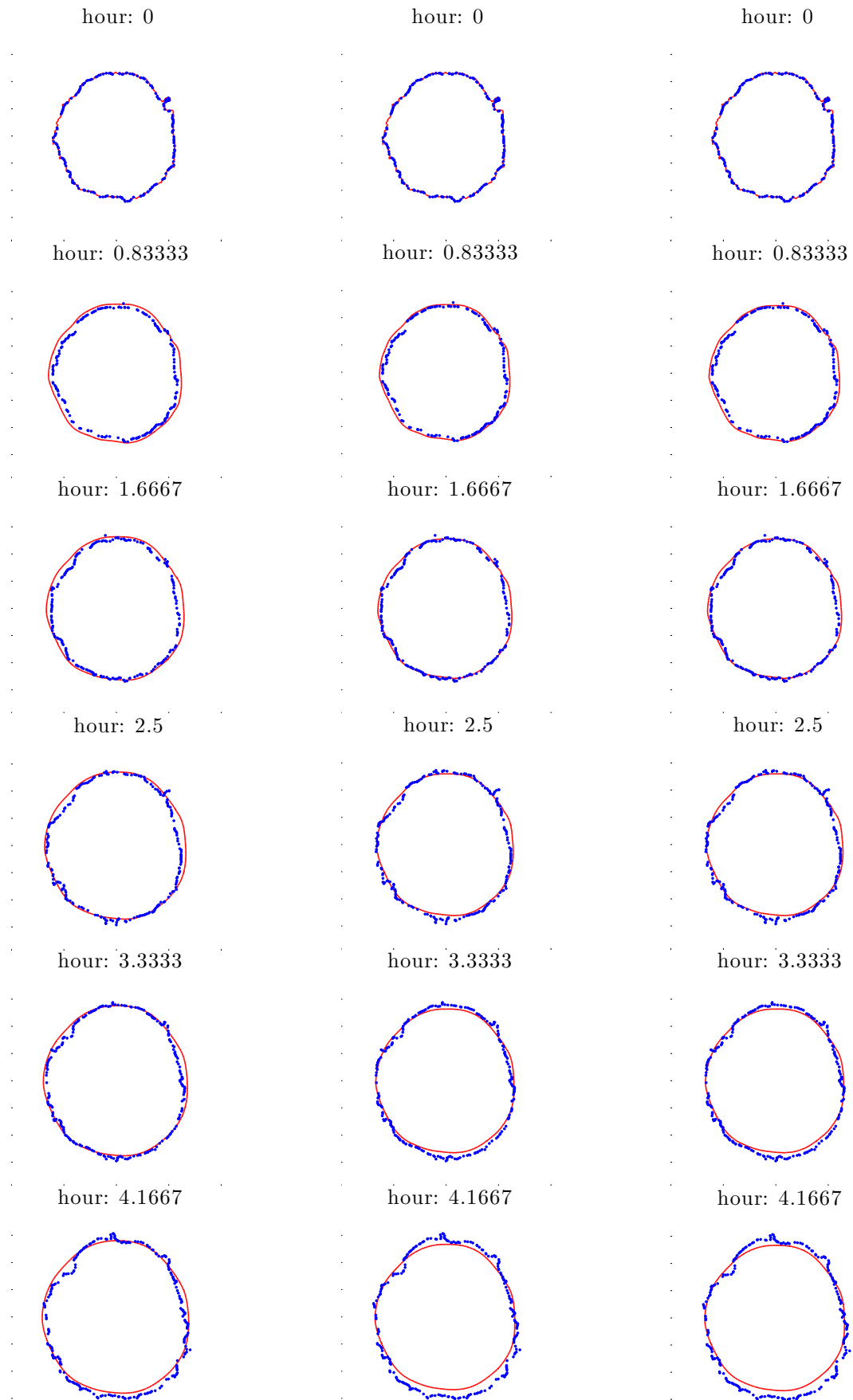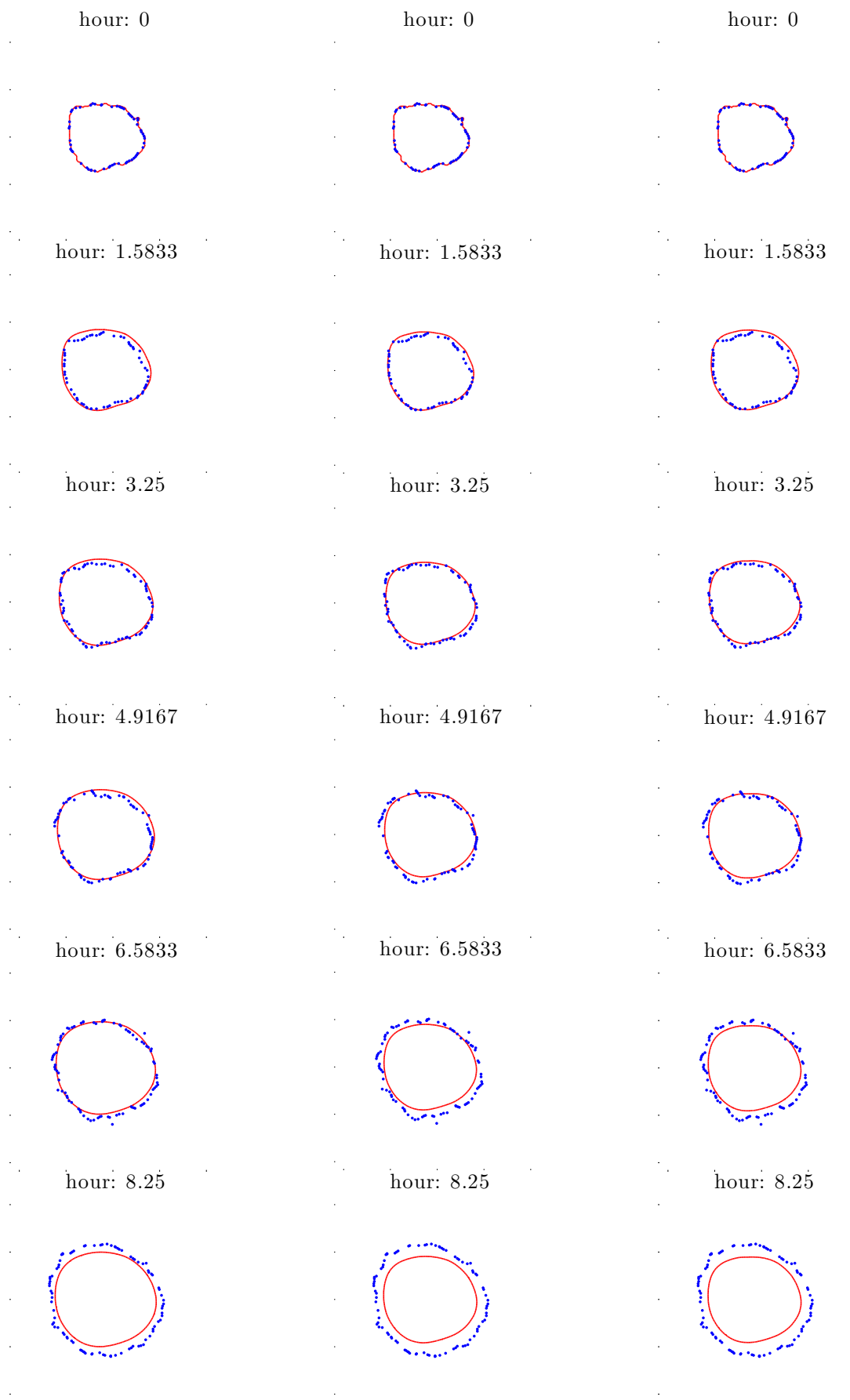

(a) **Full** parameters:
error 1590752.25980375

(b) **First Half** parameters:
error 1529213.46464141

(c) **Second Half** parameters:
error 1428595.55645507

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Pos5 exp2

Time Length	Estimated F/k	Estimated k/b
Full	0.8012991691	6833.3317566531
First Half	0.5242310598	10977.7104692166
Second Half	0.5015108053	17038.3892808501

Pos5 exp2: Simulating the **Full** time length (frames 1-120)

hour: 0

hour: 0

hour: 0

hour: 1.5833

hour: 1.5833

hour: 1.5833

hour: 3.25

hour: 3.25

hour: 3.25

hour: 4.9167

hour: 4.9167

hour: 4.9167

hour: 6.5833

hour: 6.5833

hour: 6.5833

hour: 8.25

hour: 8.25

hour: 8.25

(a) **Full** parameters: error 3468348.23811190

(b) **First Half** parameters: error 3538670.56263672

(c) **Second Half** parameters: error 3551127.88455402

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Pos5 exp2: Simulating the **First Half** time length (frames 1-60)

hour: 0   hour: 0   hour: 0

hour: 0.83333   hour: 0.83333   hour: 0.83333

hour: 1.6667   hour: 1.6667   hour: 1.6667

hour: 2.5   hour: 2.5   hour: 2.5

hour: 3.3333   hour: 3.3333   hour: 3.3333

hour: 4.1667   hour: 4.1667   hour: 4.1667

(a) **Full** parameters: (b) **First Half** parameters: (c) **Second Half** parameters:
error 1089865.32975761   error 1048667.07794412   error 1059796.70390832

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Pos5 exp2: Simulating the **Second Half** time length (frames 61-120) [*hour 0 should be hour 5*]
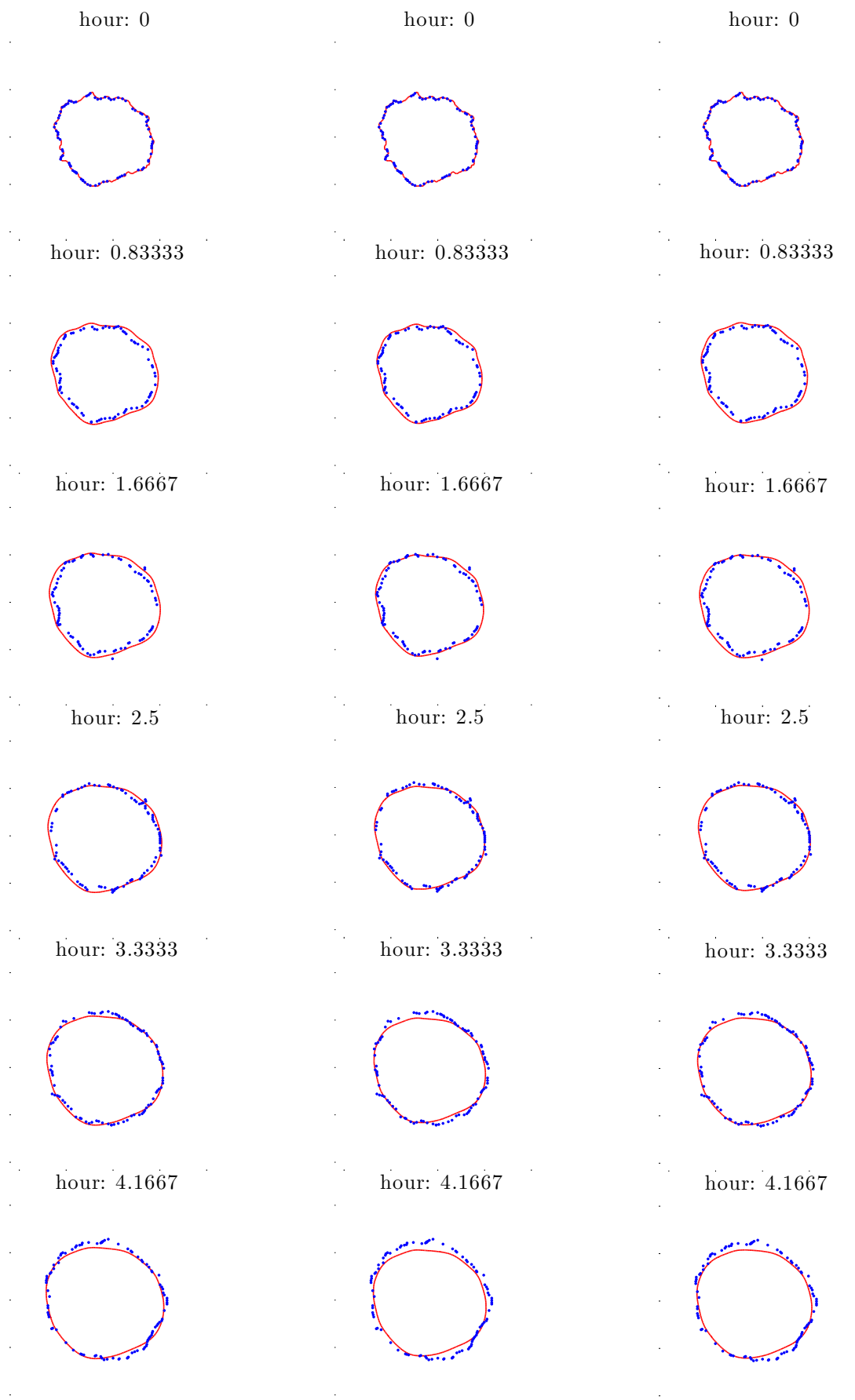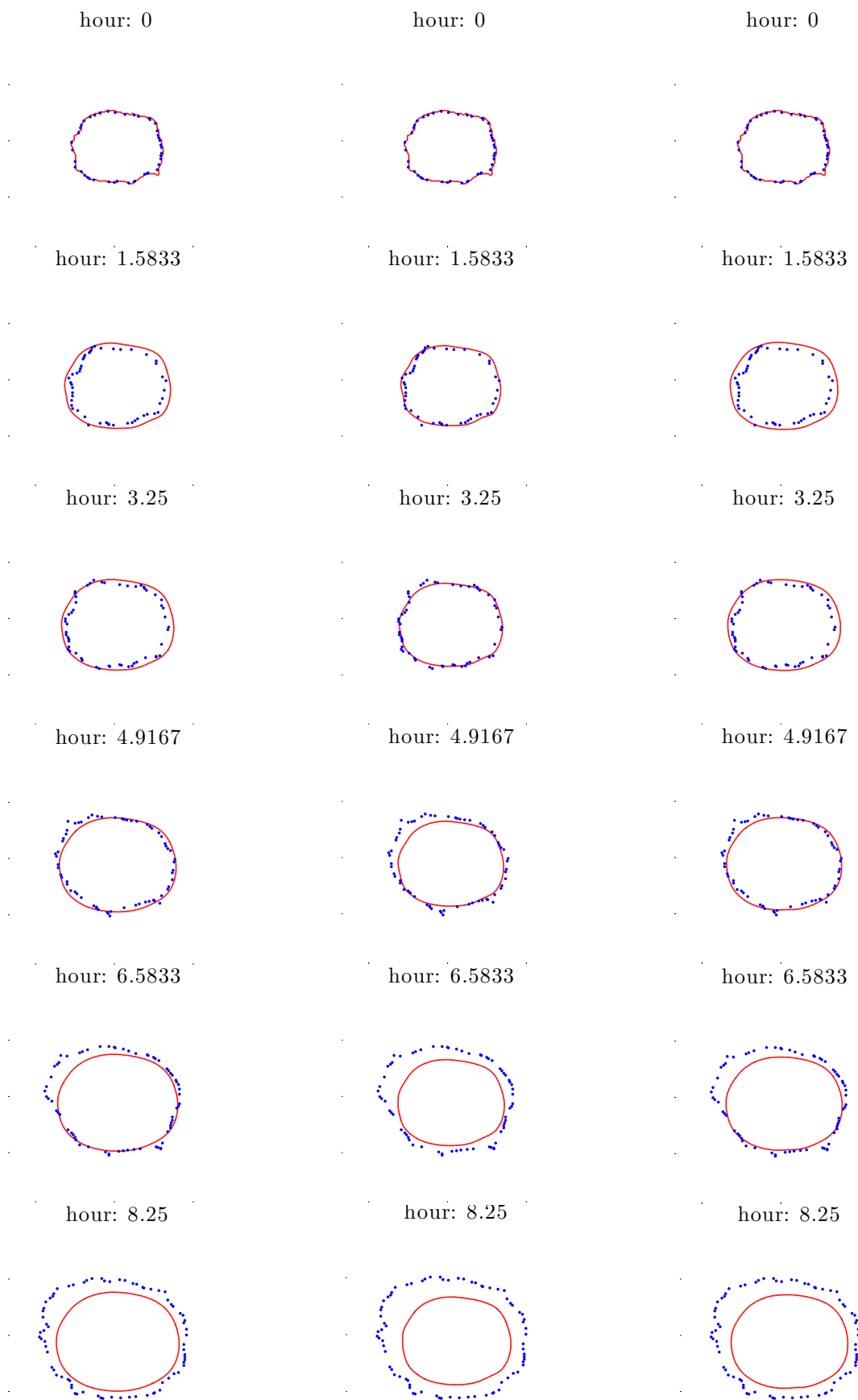

(a) **Full** parameters:
error 1365164.56477798

(b) **First Half** parameters:
error 1343595.12364259

(c) **Second Half** parameters:
error 1326935.43227224

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Pos10 exp2

Time Length	Estimated F/k	Estimated k/b
Full	0.8314484349	3741.9517580108
First Half	0.4371292942	5857.3294835273
Second Half	0.570735699	12002.0206171335

Pos10 exp2: Simulating the **Full** time length (frames 1-120)

hour: 0

hour: 0

hour: 0

hour: 1.5833

hour: 1.5833

hour: 1.5833

hour: 3.25

hour: 3.25

hour: 3.25

hour: 4.9167

hour: 4.9167

hour: 4.9167

hour: 6.5833

hour: 6.5833

hour: 6.5833
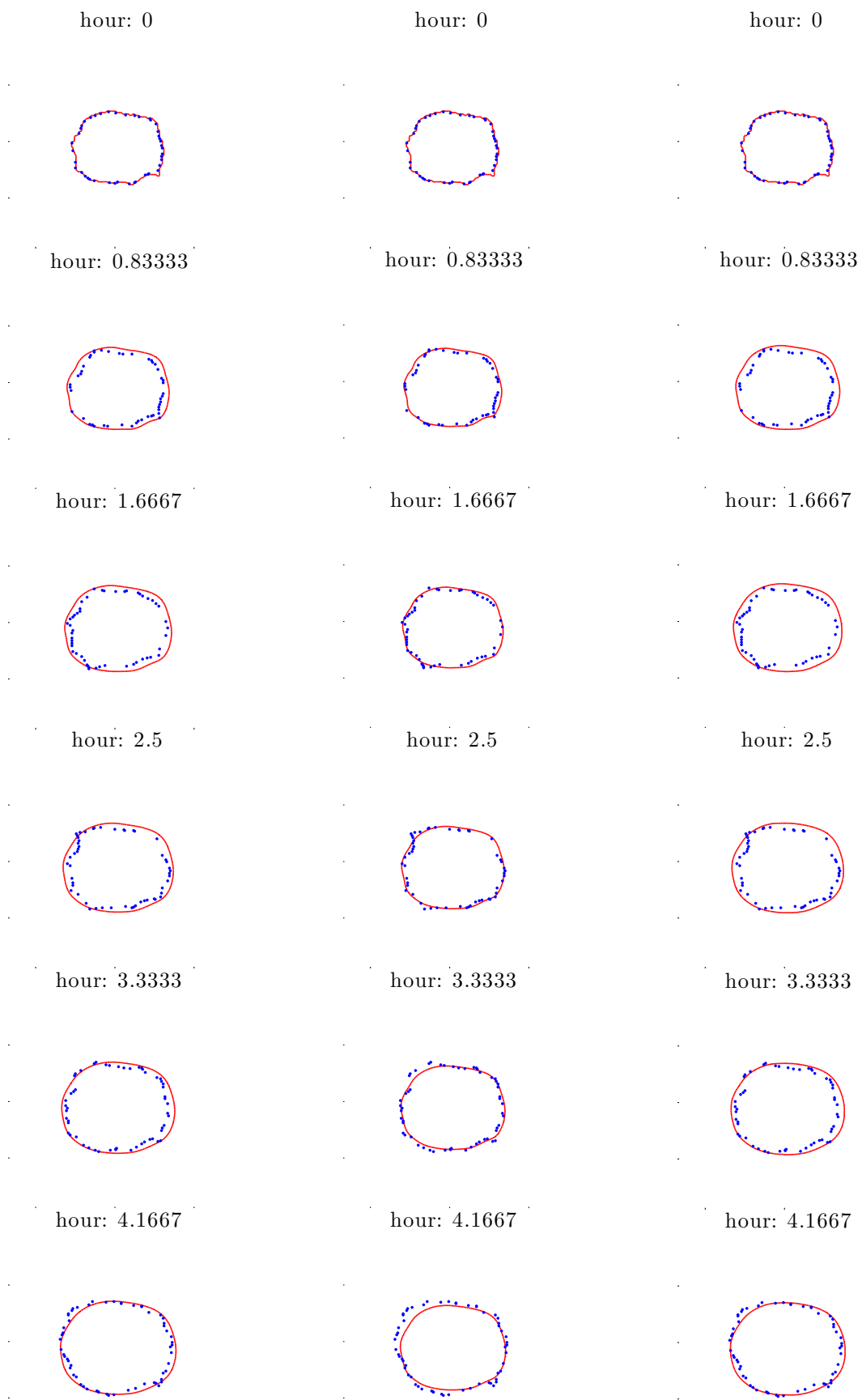
hour: 8.25

hour: 8.25

hour: 8.25

(a) **Full** parameters: error 4097361.38256544

(b) **First Half** parameters: error 4223860.22175920

(c) **Second Half** parameters: error 4205345.95231079

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hour: 0   hour: 0   hour: 0

hour: 0.83333   hour: 0.83333   hour: 0.83333

hour: 1.6667   hour: 1.6667   hour: 1.6667

hour: 2.5   hour: 2.5   hour: 2.5

hour: 3.3333   hour: 3.3333   hour: 3.3333
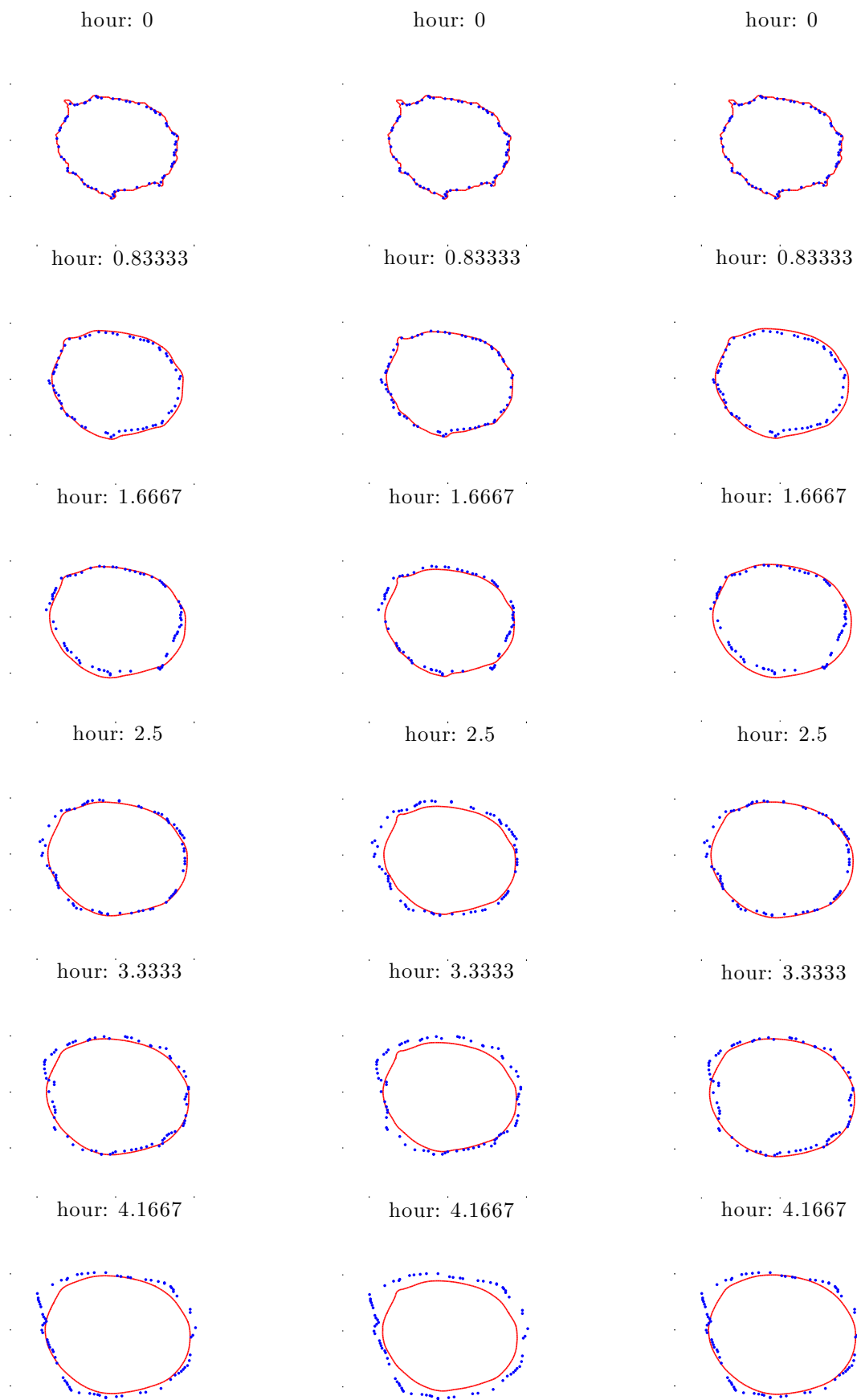
hour: 4.1667   hour: 4.1667   hour: 4.1667

(a) **Full** parameters: error 1136685.17157272

(b) **First Half** parameters: error 1053128.48687592

(c) **Second Half** parameters: error 1188303.05722478

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Pos10 exp2: Simulating the **Second Half** time length (frames 61-120) [*hour 0 should be hour 5*]
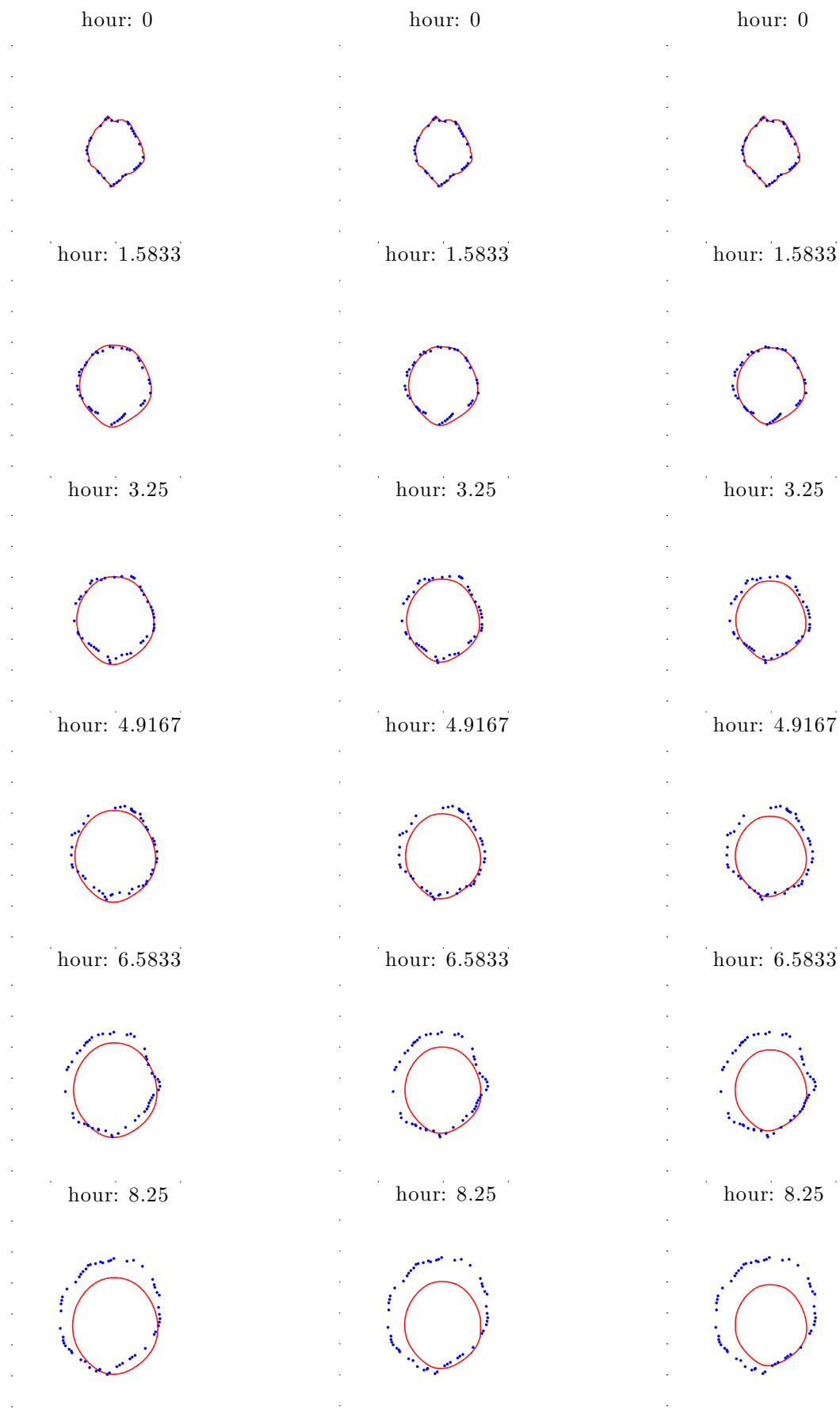
(a) **Full** parameters: error 1736985.78216639

(b) **First Half** parameters: error 1825332.39442093

(c) **Second Half** parameters: error 1551458.41010493

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Pos14 exp8

| Time Length	Estimated F/k	Estimated k/b
Full	1.0711682858	2832.2499810798
First Half	0.7395095223	4622.6470044375
Second Half	0.578052328	6794.1595948324

(a) **Full** parameters:
error 4053533.70424384

(b) **First Half** parameters:
error 4085190.10957947

(c) **Second Half** parameters:
error 4145230.23342968

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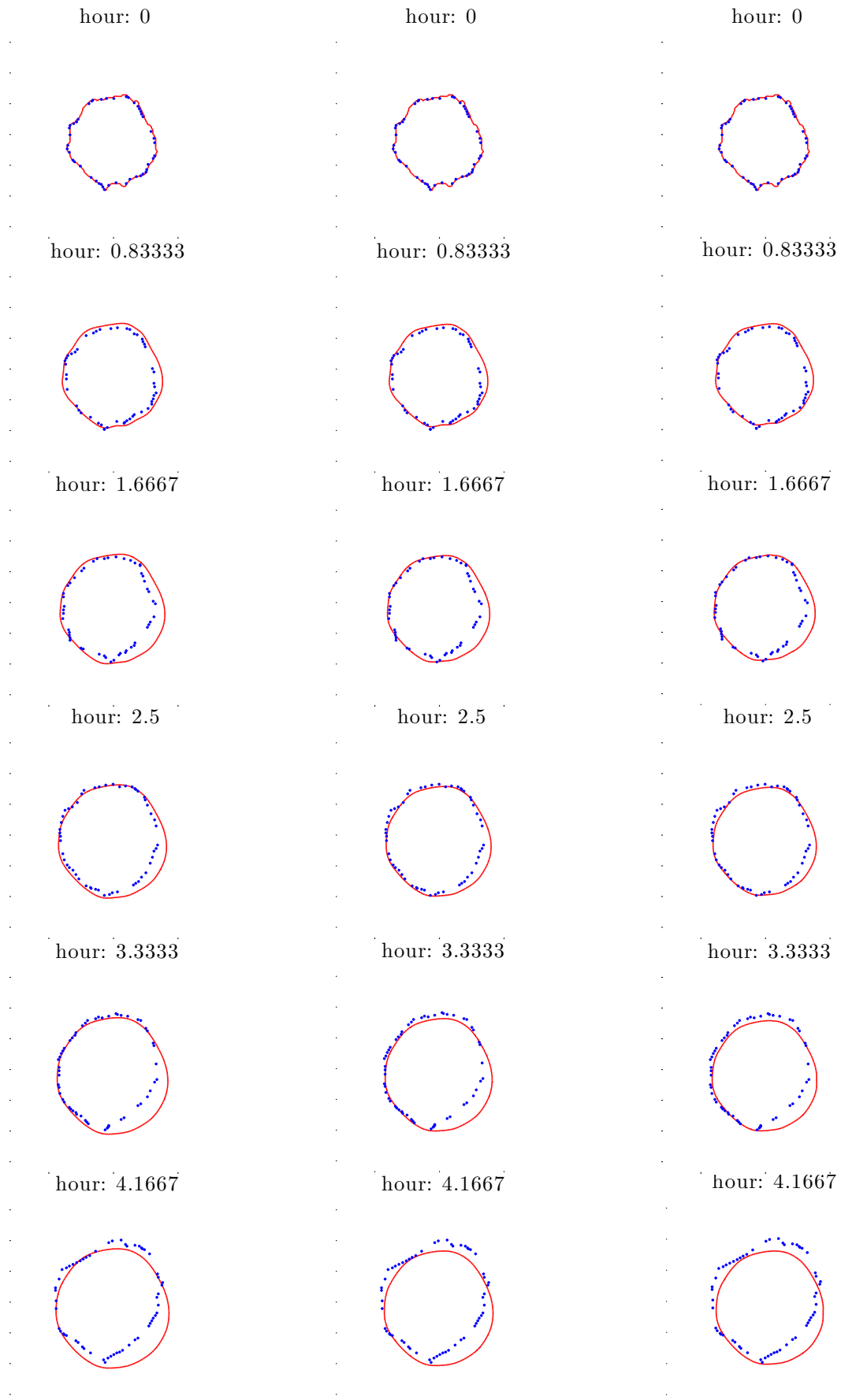**Pos14 exp8:** Simulating the **First Half** time length (frames 1-60)
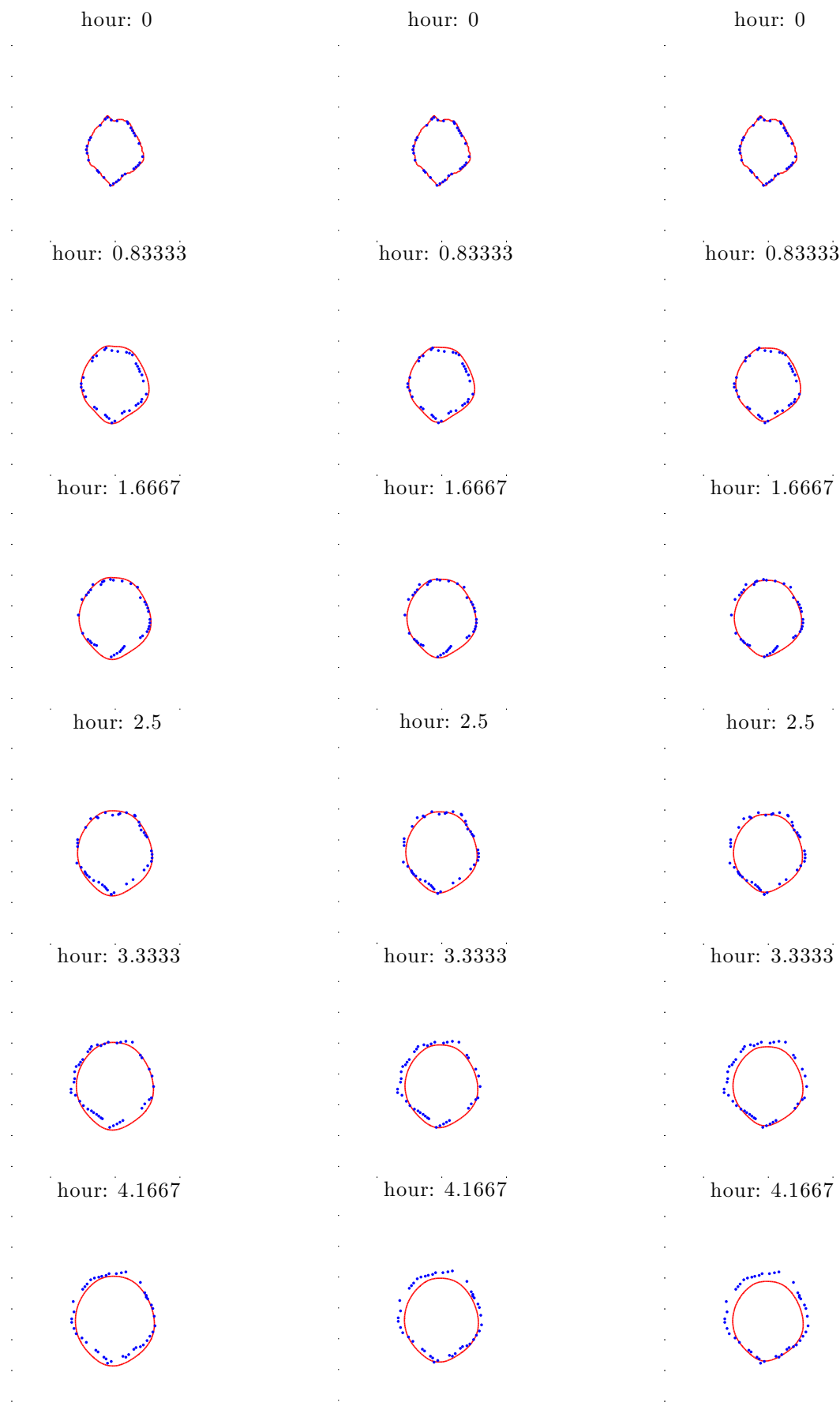
(a) **Full** parameters:
error 1313678.93217561

(b) **First Half** parameters:
error 1302107.57869745

(c) **Second Half** parameters:
error 1311780.79305664

06/16/2014

Pos14 exp8: Simulating the **Second Half** time length (frames 61-120) [*hour 0 should be hour 5*]

hour: 0　　　　　hour: 0　　　　　hour: 0

hour: 0.83333　　　hour: 0.83333　　　hour: 0.83333

hour: 1.6667　　　hour: 1.6667　　　hour: 1.6667

hour: 2.5　　　　hour: 2.5　　　　hour: 2.5

hour: 3.3333　　　hour: 3.3333　　　hour: 3.3333

hour: 4.1667　　　hour: 4.1667　　　hour: 4.1667

(a) **Full** parameters:　　(b) **First Half** parameters:　　(c) **Second Half** parameters:
error 1439465.35670884　　error 1404379.23730973　　error 1394108.38474321

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