Phase Advance in Quads

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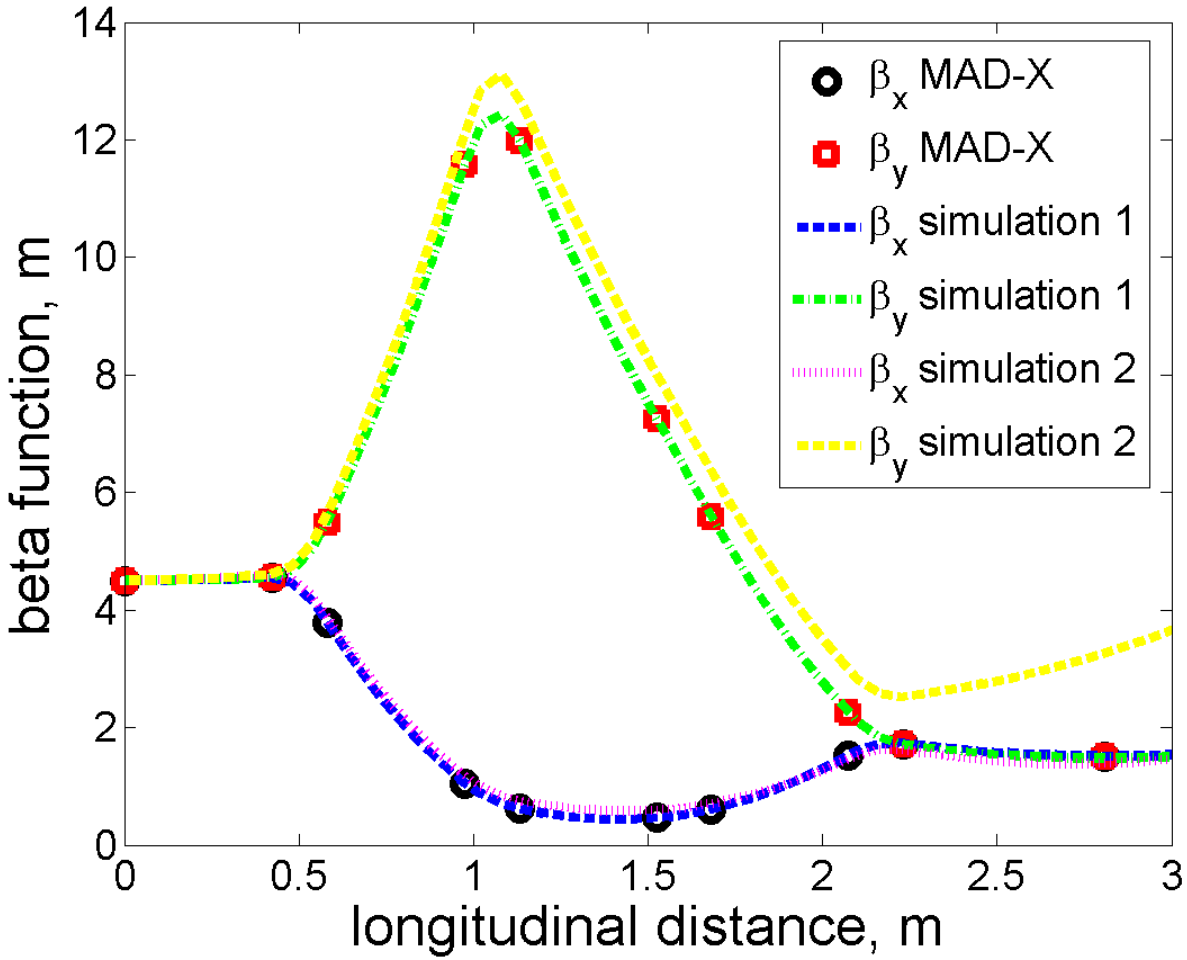
Quads setting

- 0m - 0.4245m : Drift
- 0.4245m - 0.5815m : Q1, K1=-7.56277
- 0.5815m - 0.9745m : Drift
- 0.9745m - 1.1315m : Q2, K1=8.50925
- 1.1315m - 1.5245m : Drift
- 1.5245m - 1.6815m : Q3, K1=0.698665
- 1.6815m - 2.0745m : Drift
- 2.0745m - 2.2315m : Q4, K1=-8.30714
- 2.2315m - 3m : Drift

β change


beta function, m
longitudinal distance, m
0
2
4
6
8
10
12
14
0
0.5
1
1.5
2
2.5
3
βx MAD-X
βy MAD-X
βx simulation 1
βy simulation 1
βx simulation 2
βy simulation 2

Calculate transverse phase advance using

- Transfer matrix
- Simulation

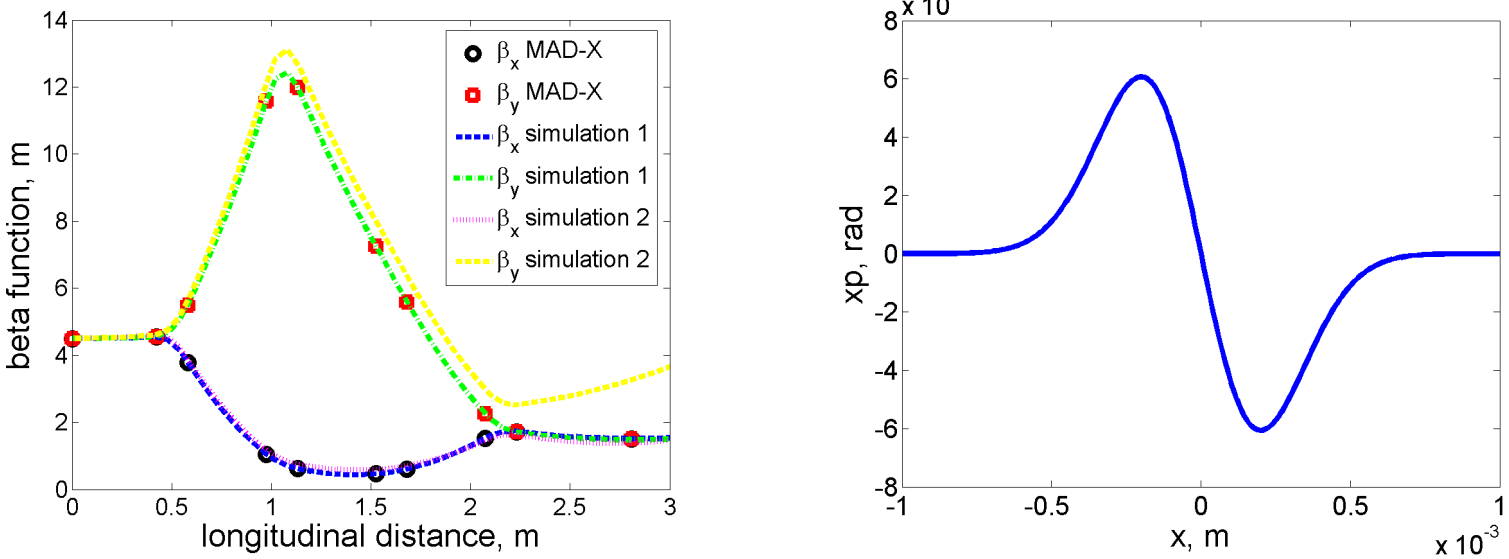


Figure: β change (left) and phase at initial (right).

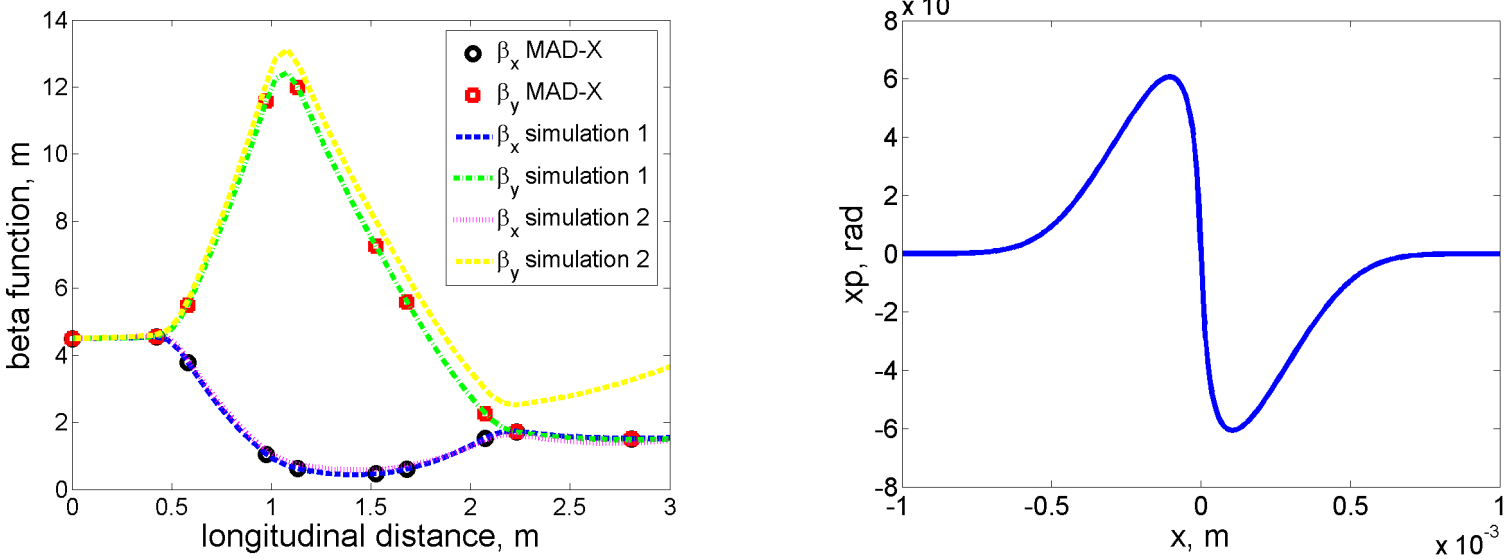


Figure: β change (left) and phase before Q1 (right).

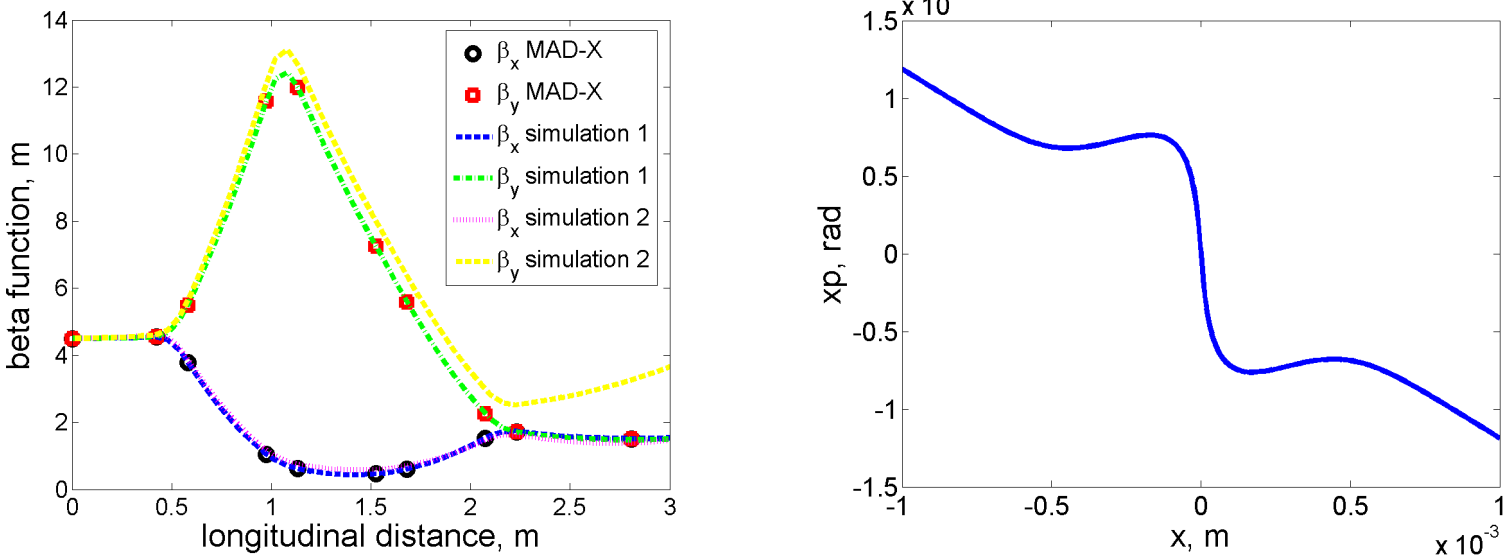


Figure: β change (left) and phase after Q1 (right).

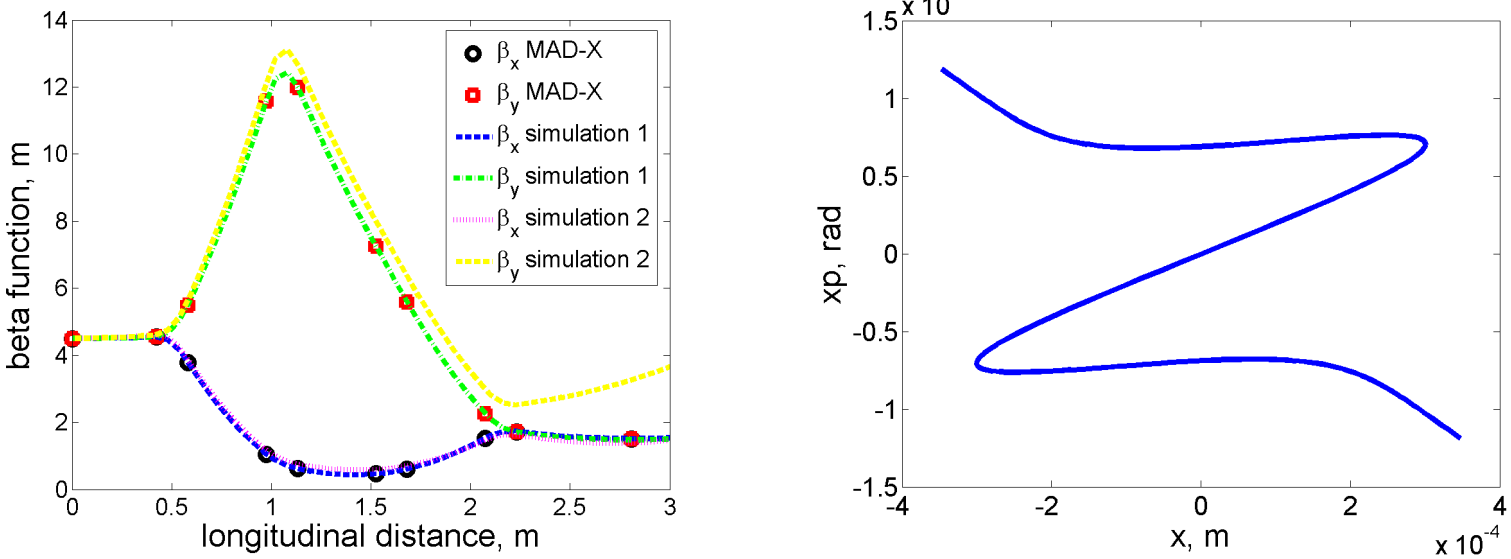


Figure: β change (left) and phase before Q2 (right).

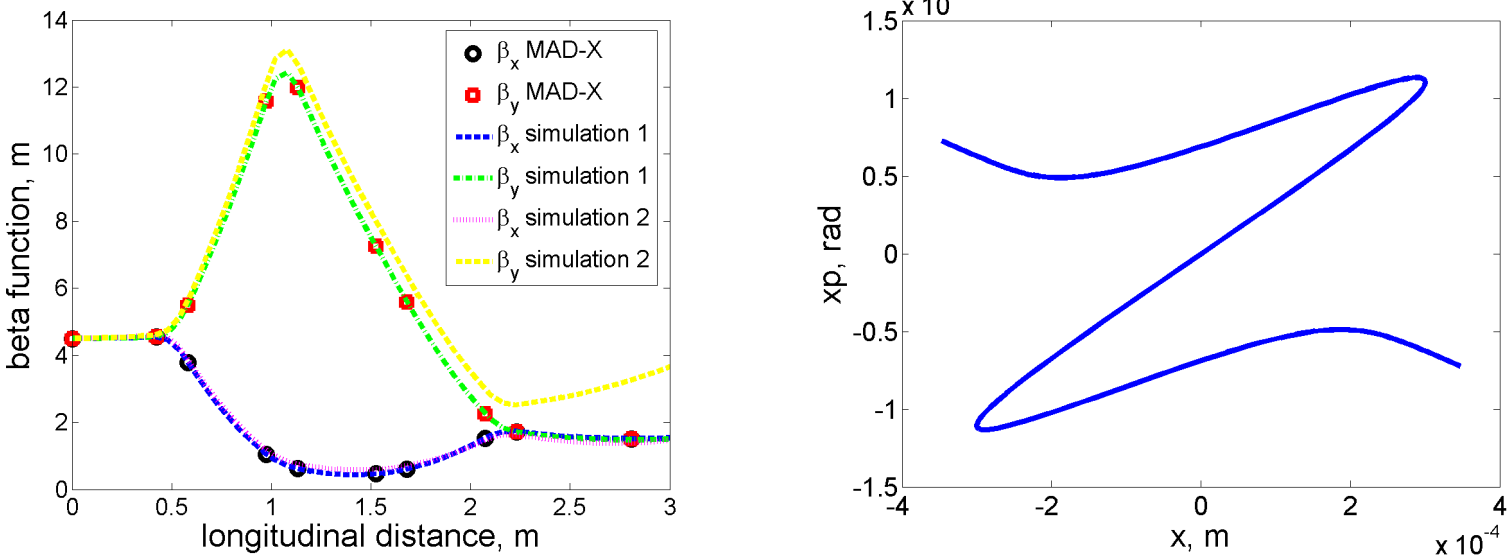


Figure: β change (left) and phase after Q2 (right).

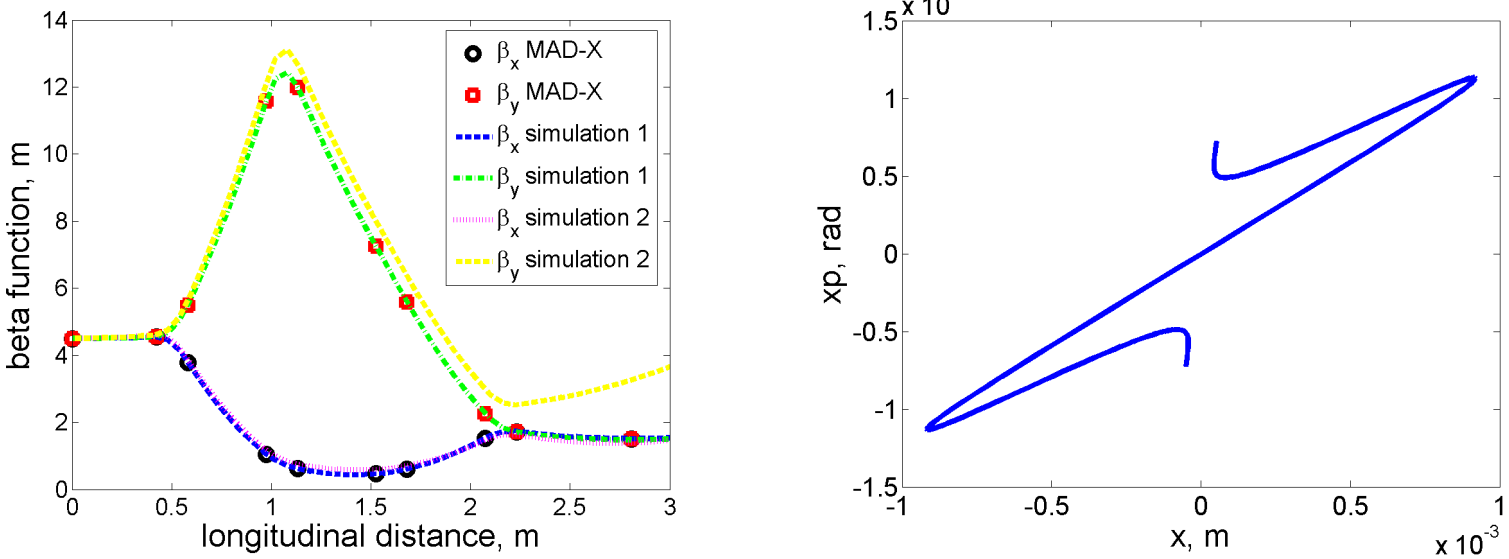


Figure: β change (left) and phase before Q3 (right).

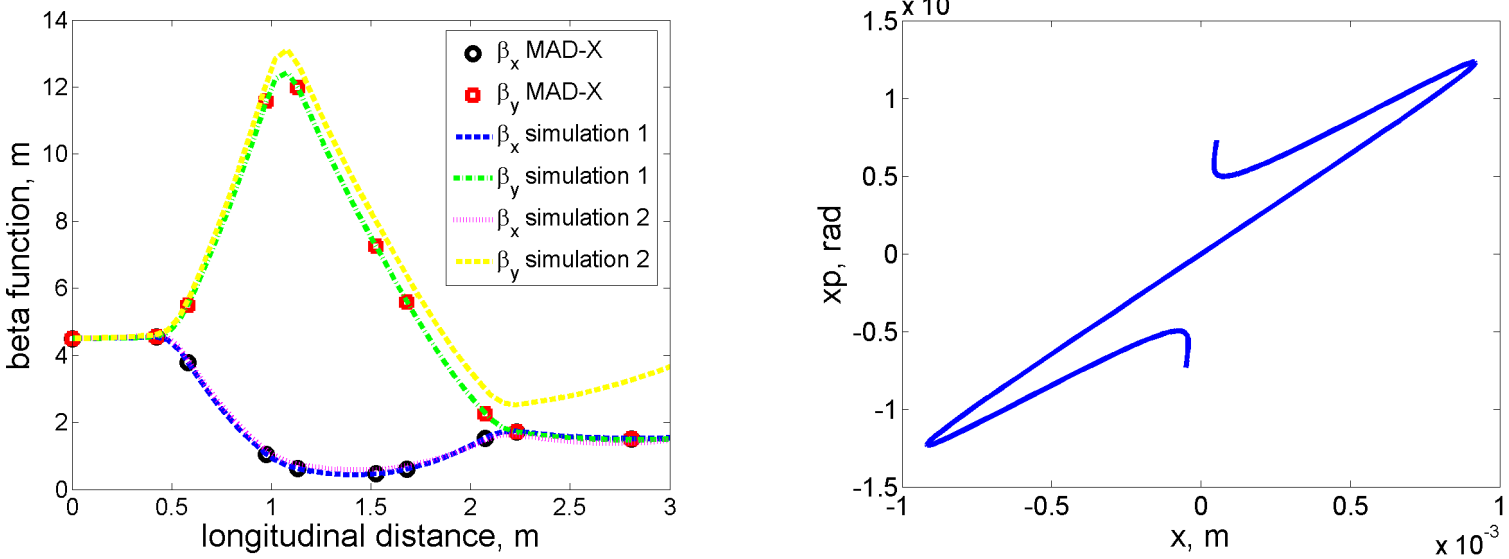


Figure: β change (left) and phase after Q3 (right).

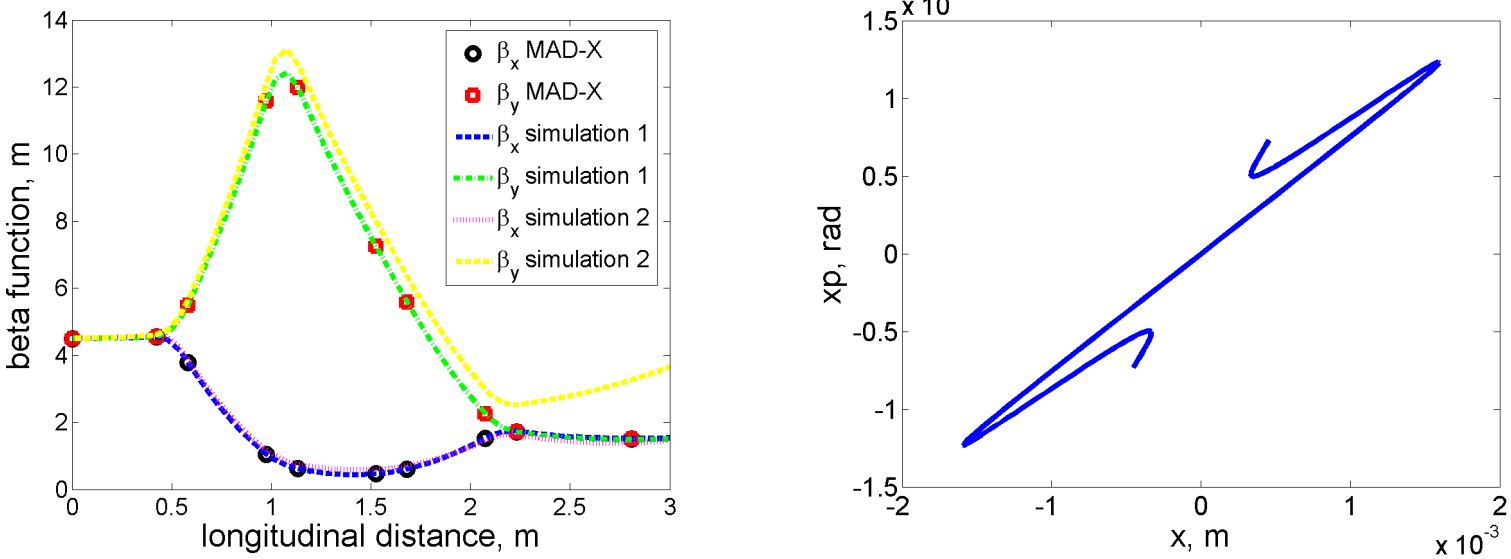


Figure: β change (left) and phase before Q4 (right).

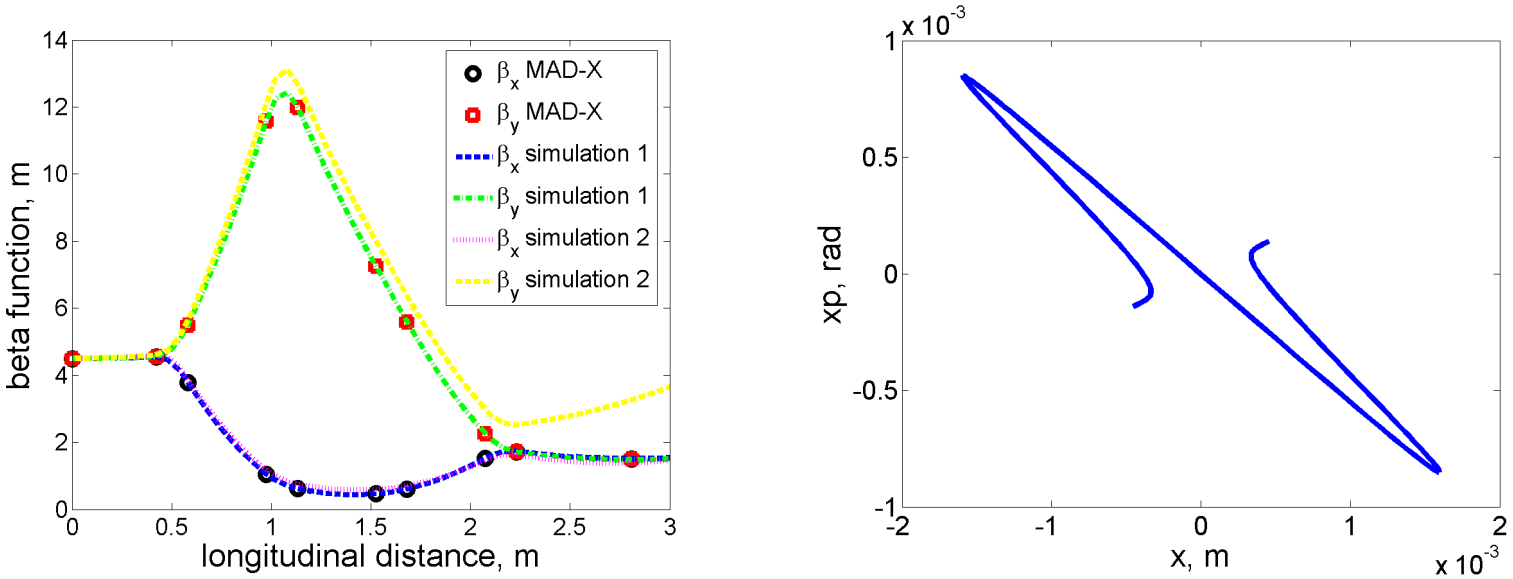


Figure: β change (left) and phase after Q4 (right).

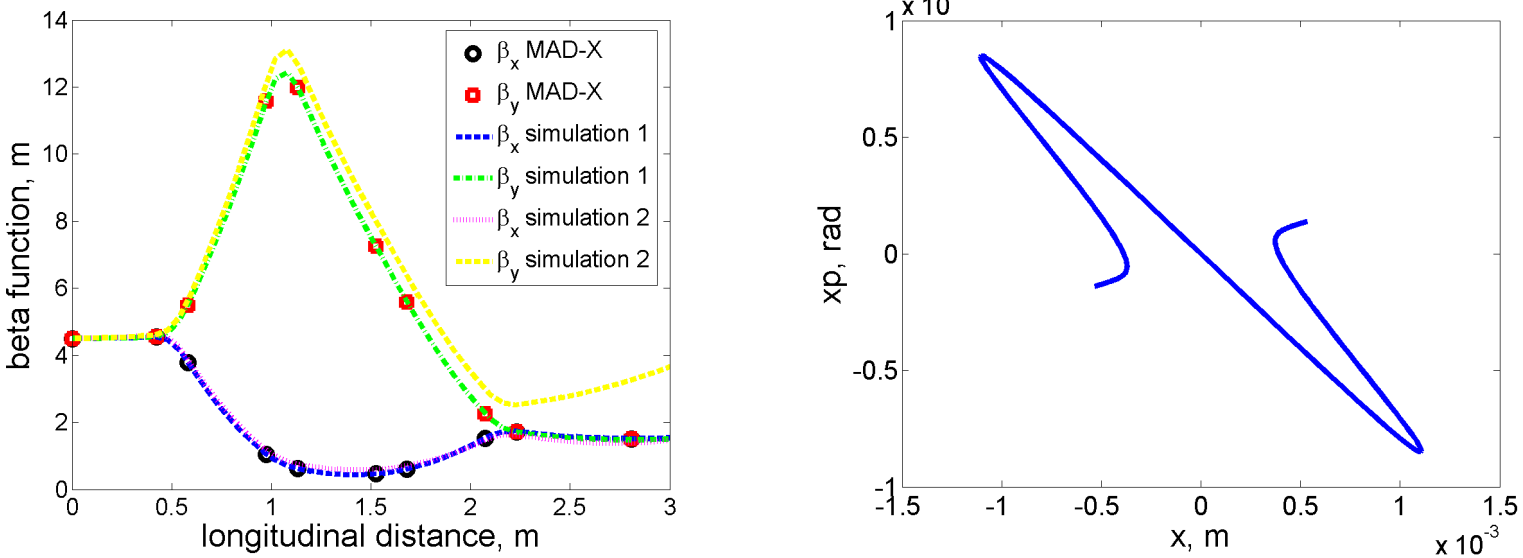


Figure: β change (left) and phase at final (right).

- Cold beam as background

  One line in transverse direction

- Cold beam with ion

  Subtract background to visualize modulation signal

- Cold beam with initial kick

  Subtract background to visualize modulation signal

- Cold beam with initial kick × 1e+6

  No need to subtract background

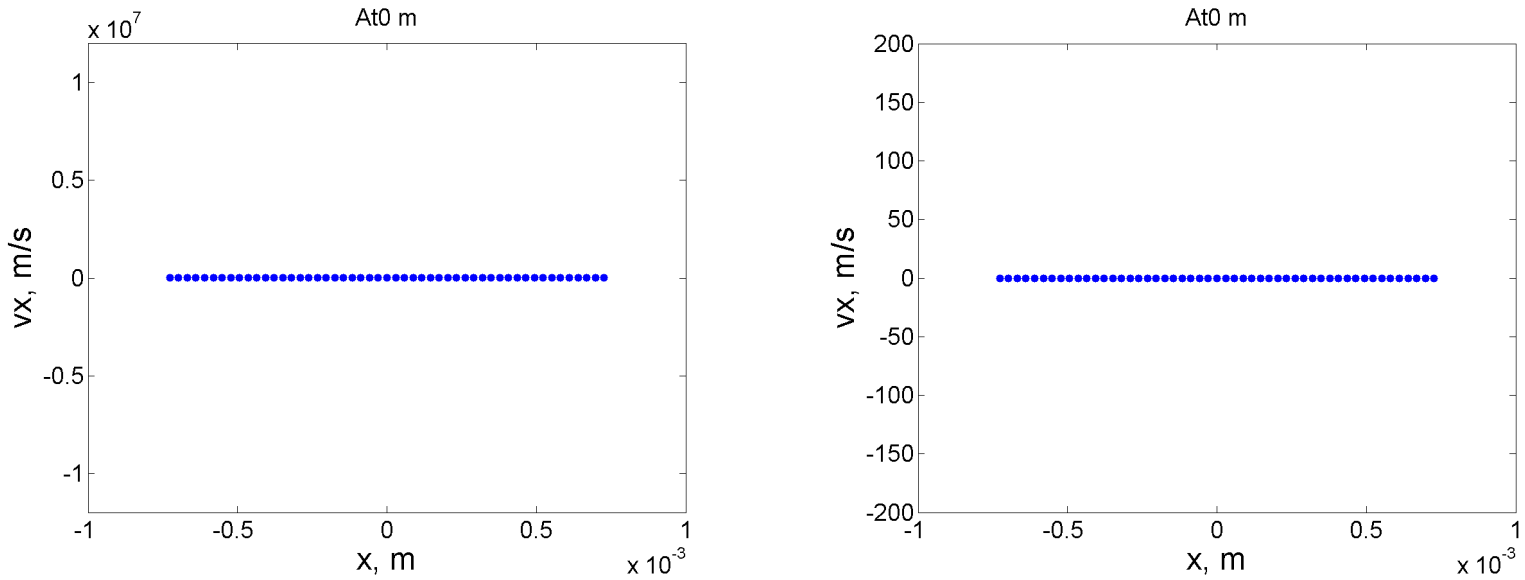


Figure: Phase at initial of background (left) and signal (right).

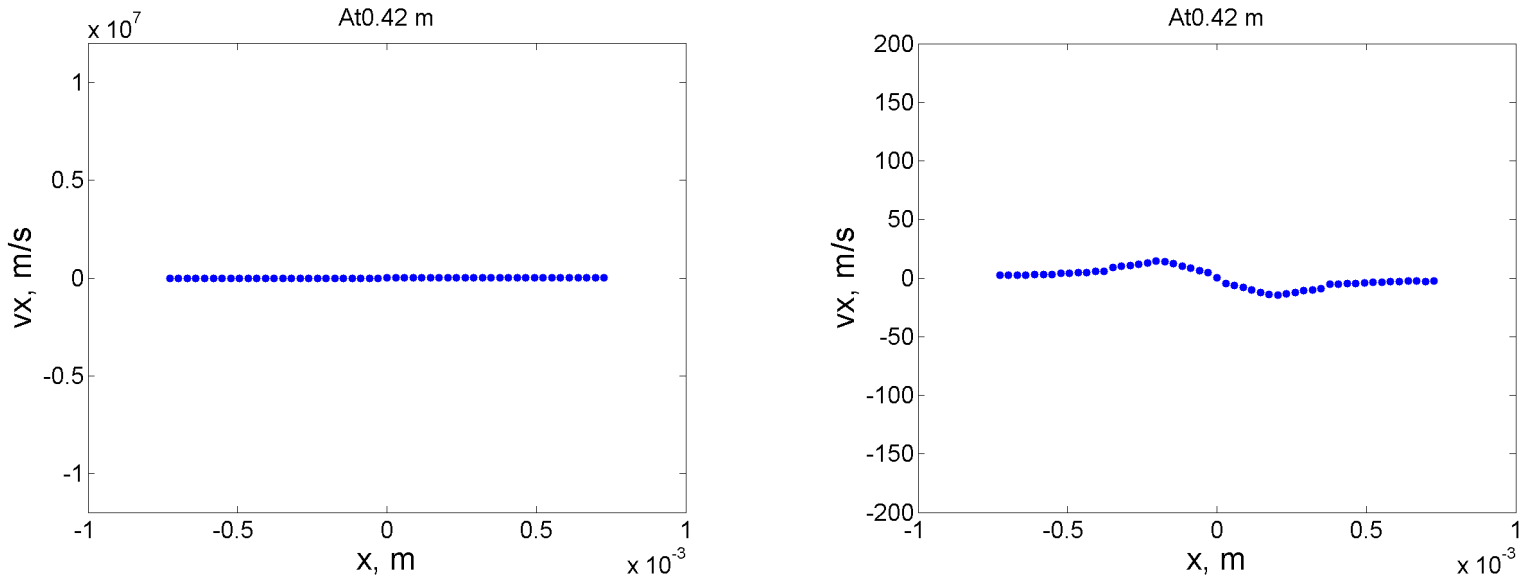


Figure: Phase before Q1 of background (left) and signal (right).

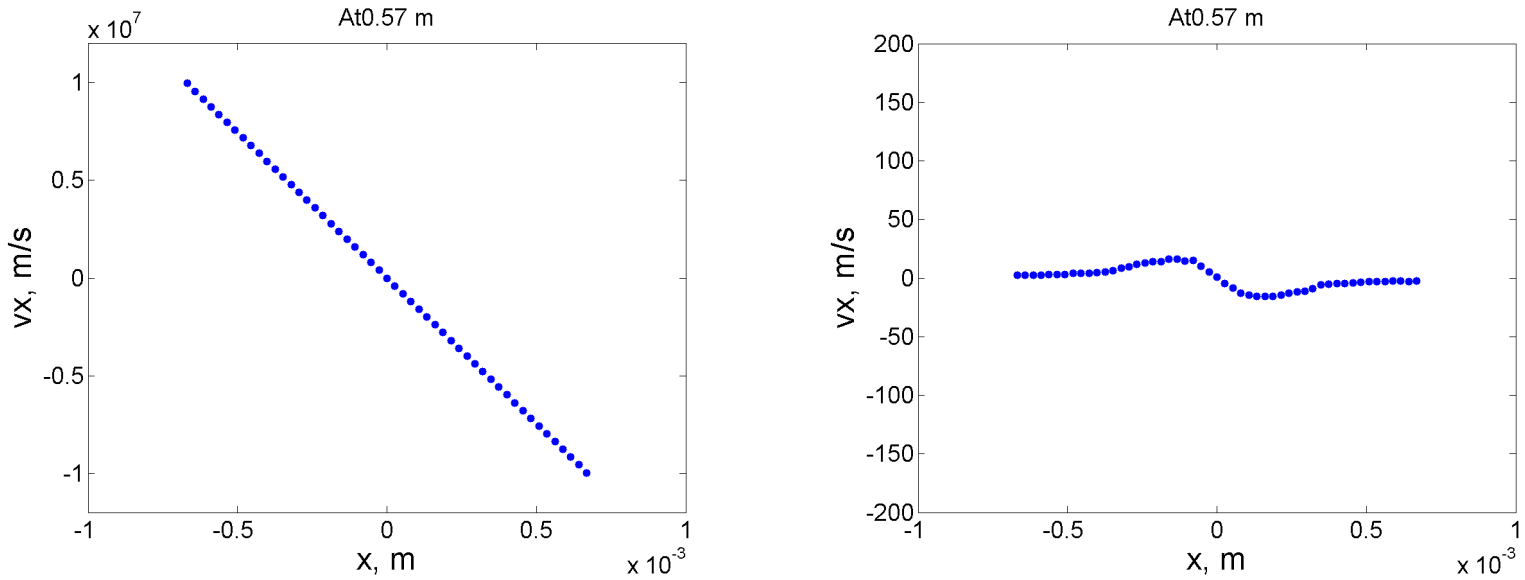


Figure: Phase after Q1 of background (left) and signal (right).

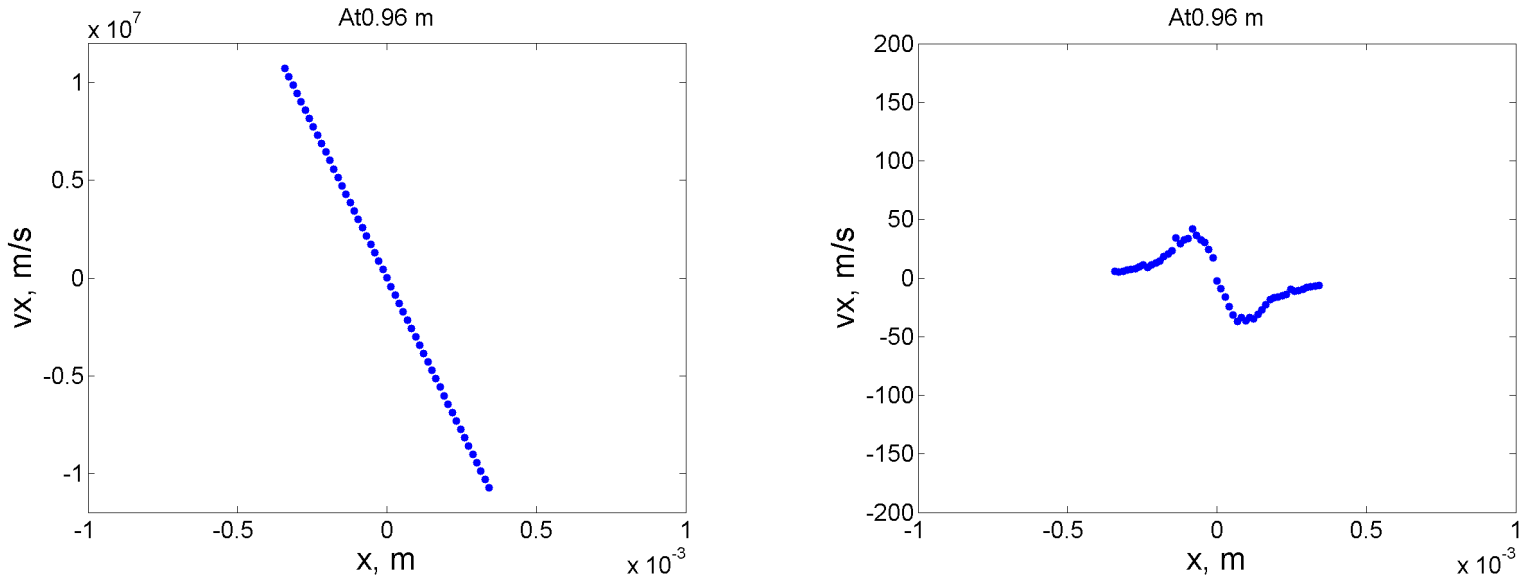


Figure: Phase before Q2 of background (left) and signal (right).

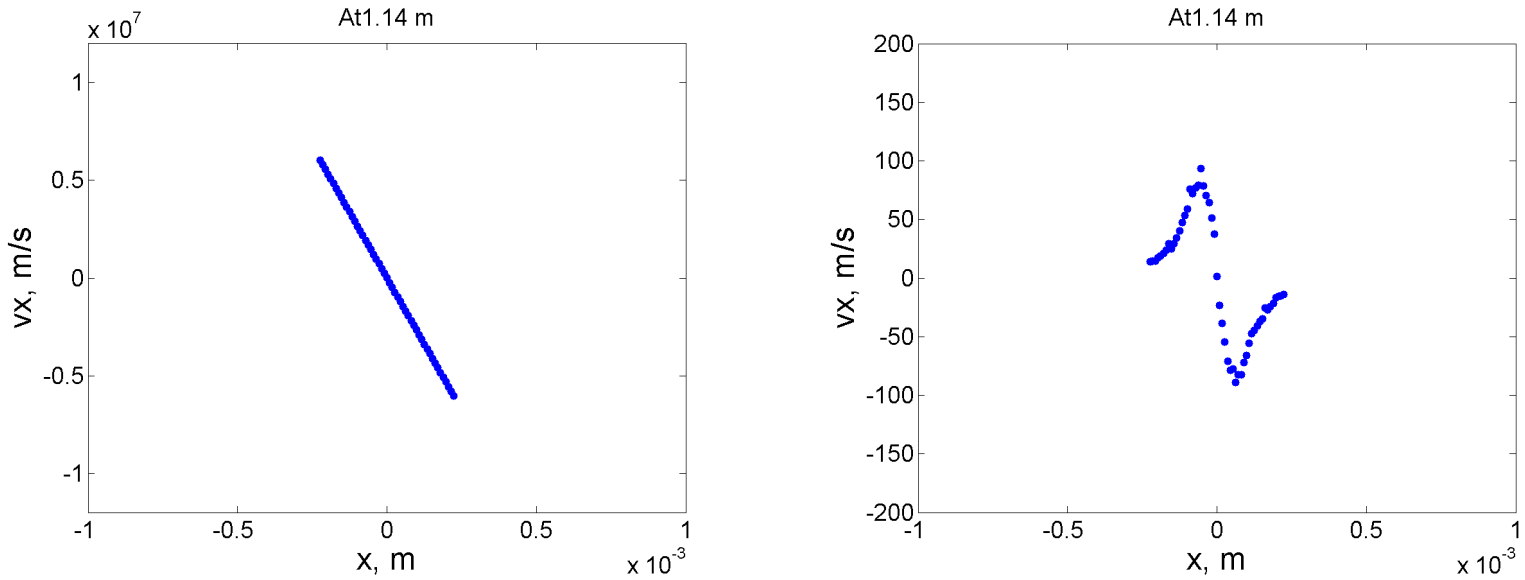


Figure: Phase after Q2 of background (left) and signal (right).

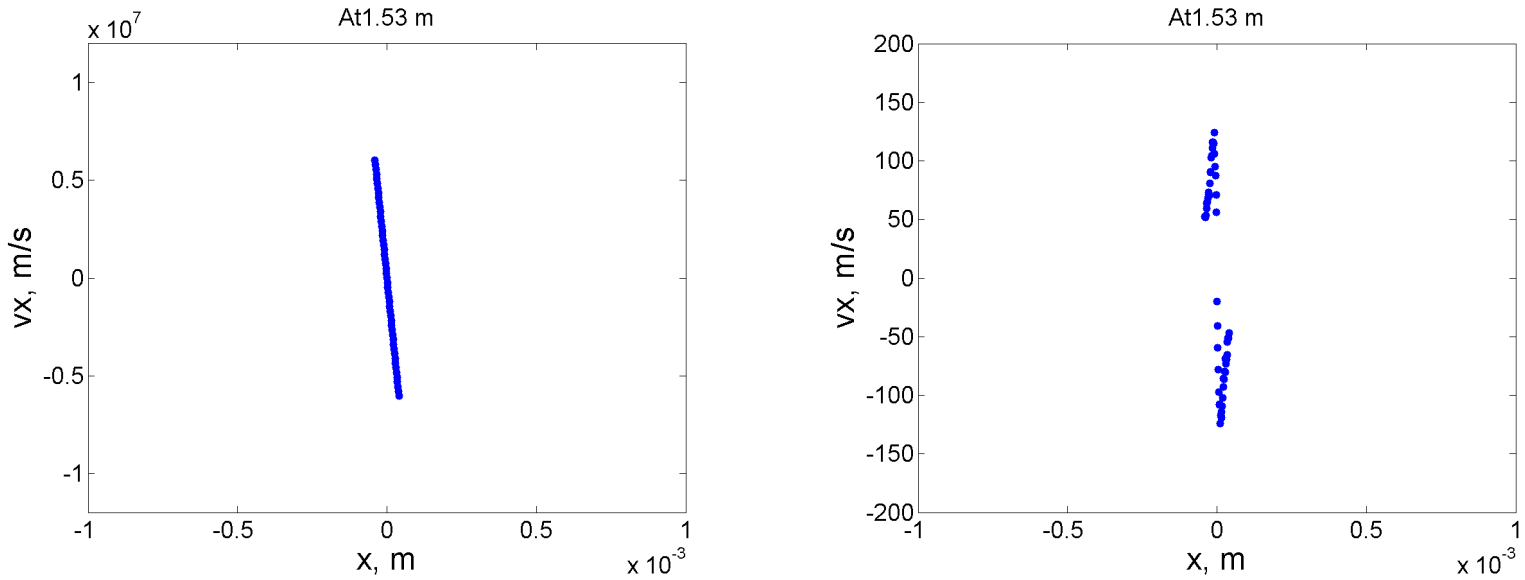


Figure: Phase before Q3 of background (left) and signal (right).

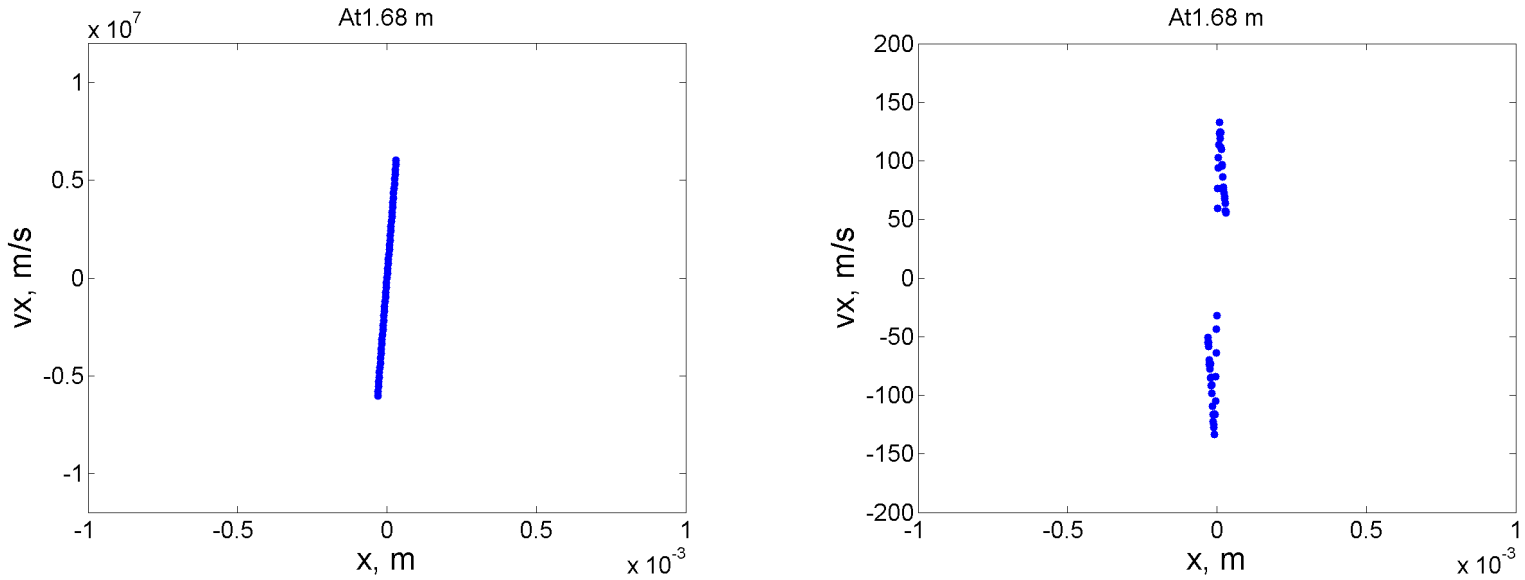


Figure: Phase after Q3 of background (left) and signal (right).

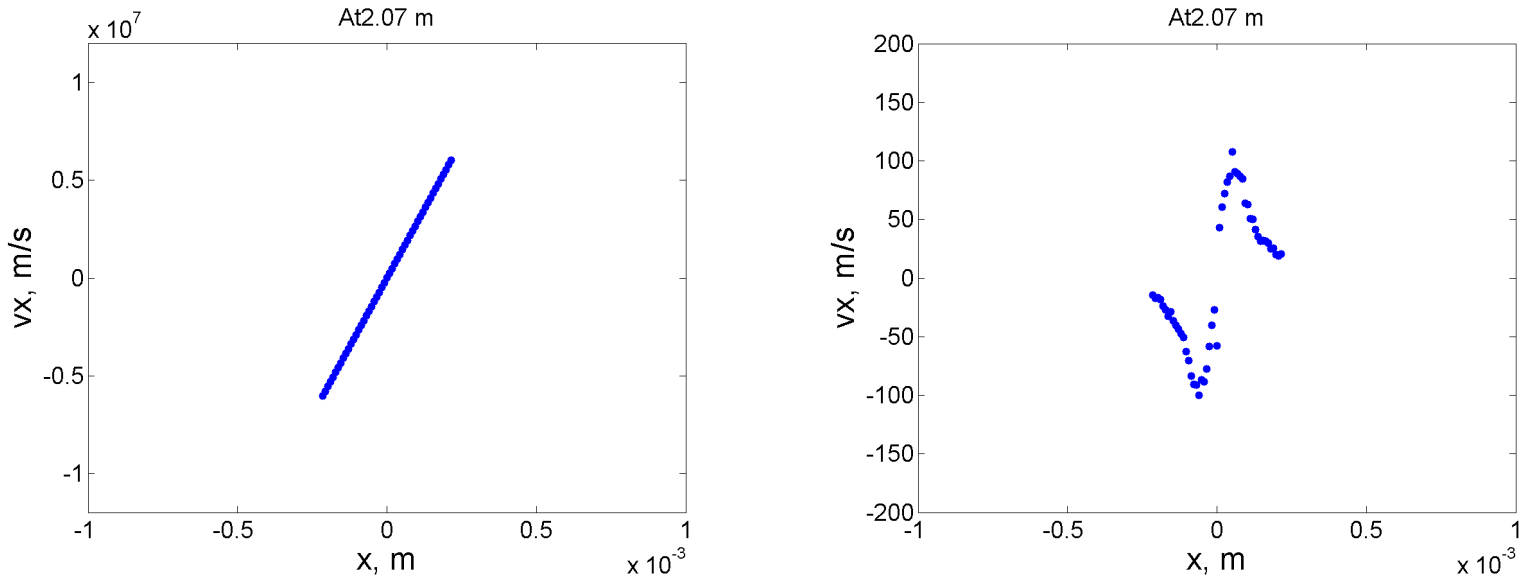


Figure: Phase before Q4 of background (left) and signal (right).

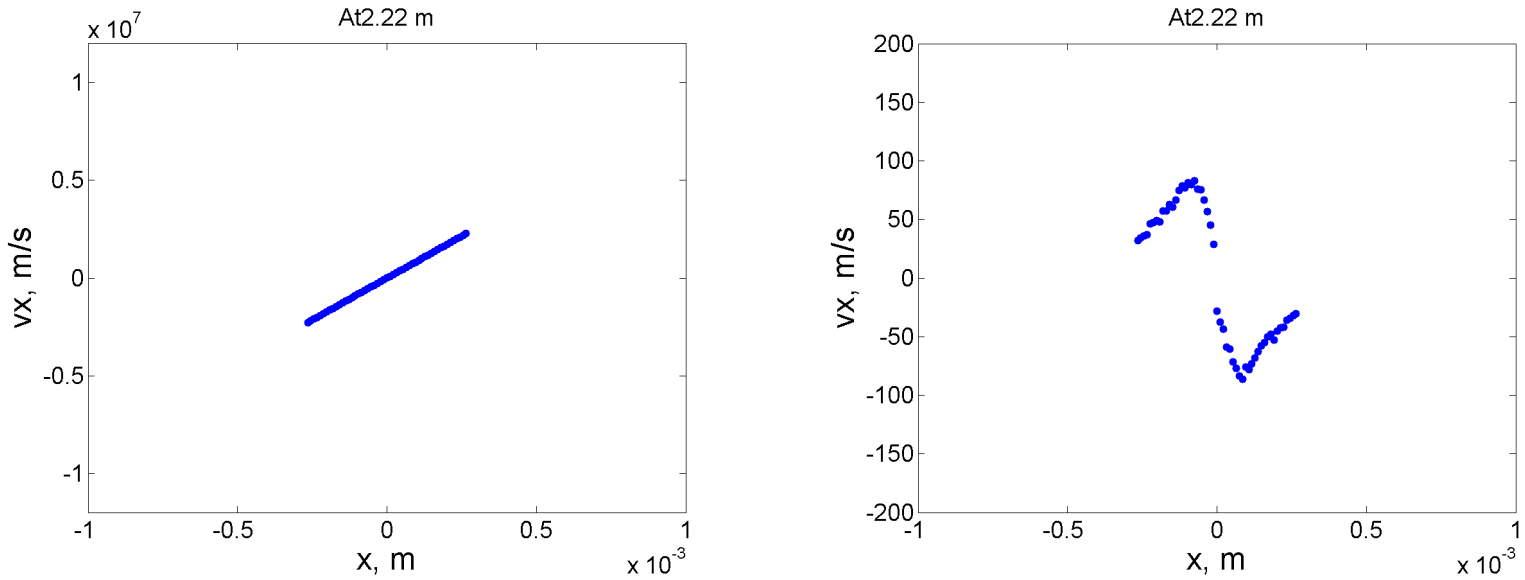


Figure: Phase after Q4 of background (left) and signal (right).

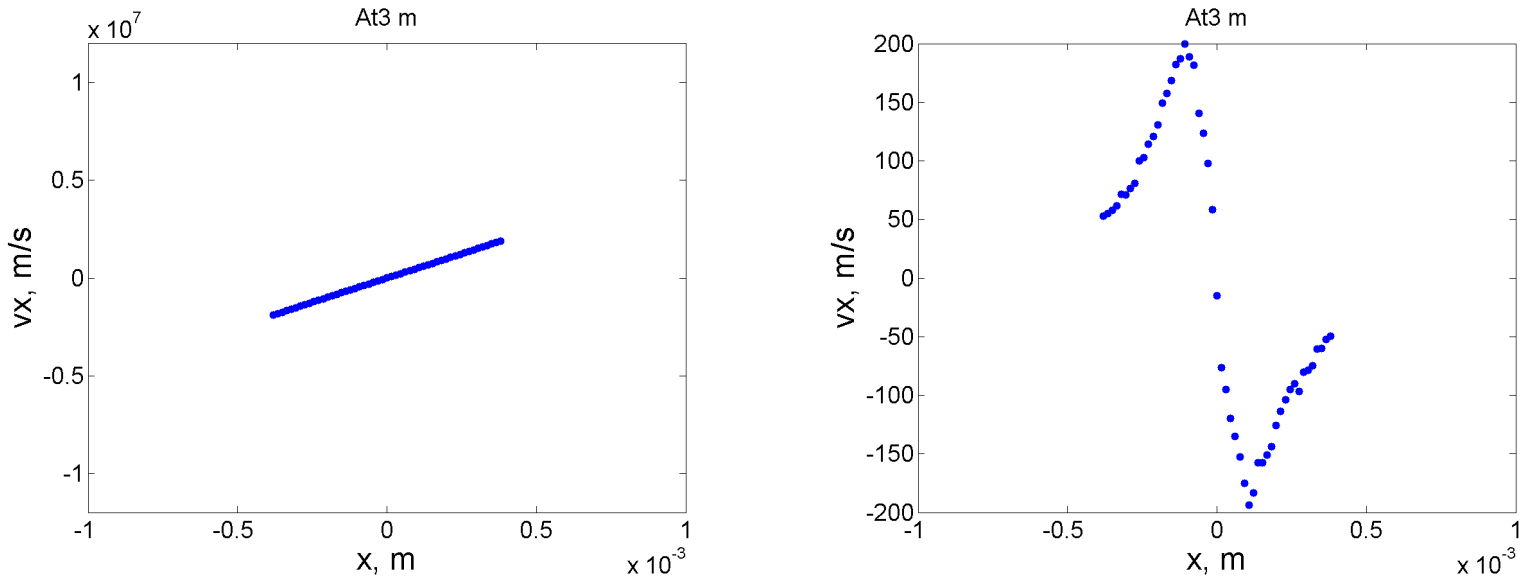


Figure: Phase at final of background (left) and signal (right).

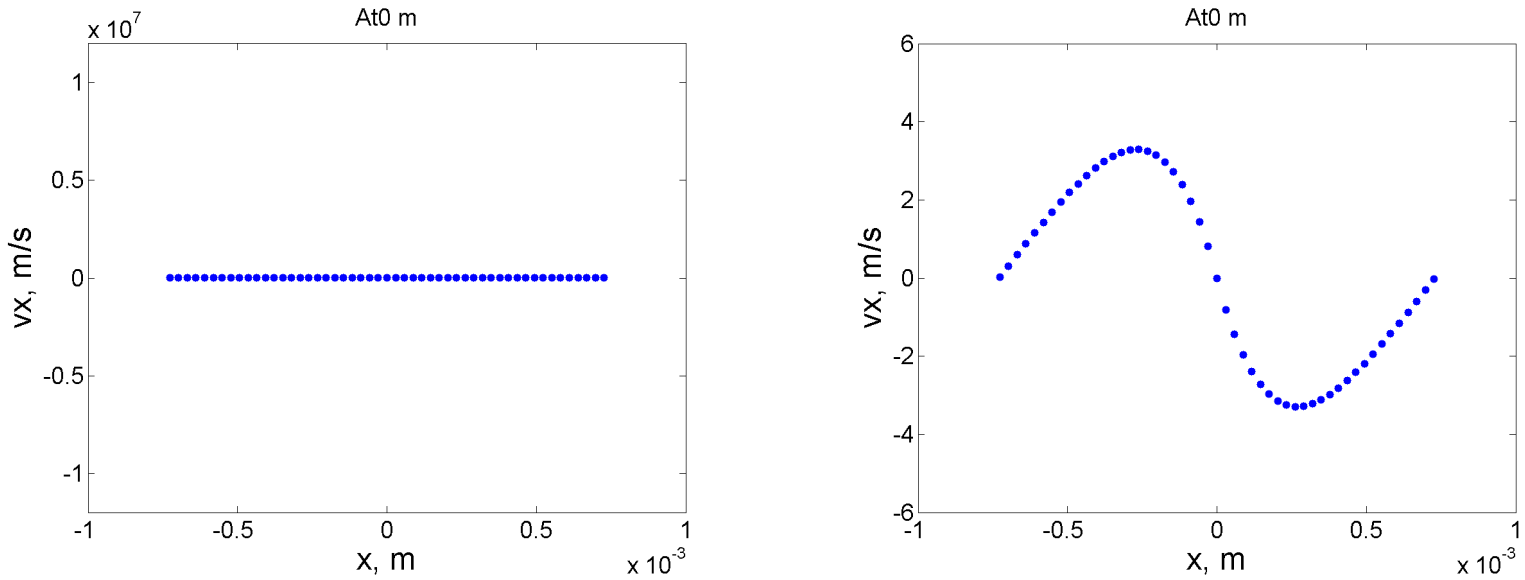


Figure: Phase at initial of background (left) and signal (right).

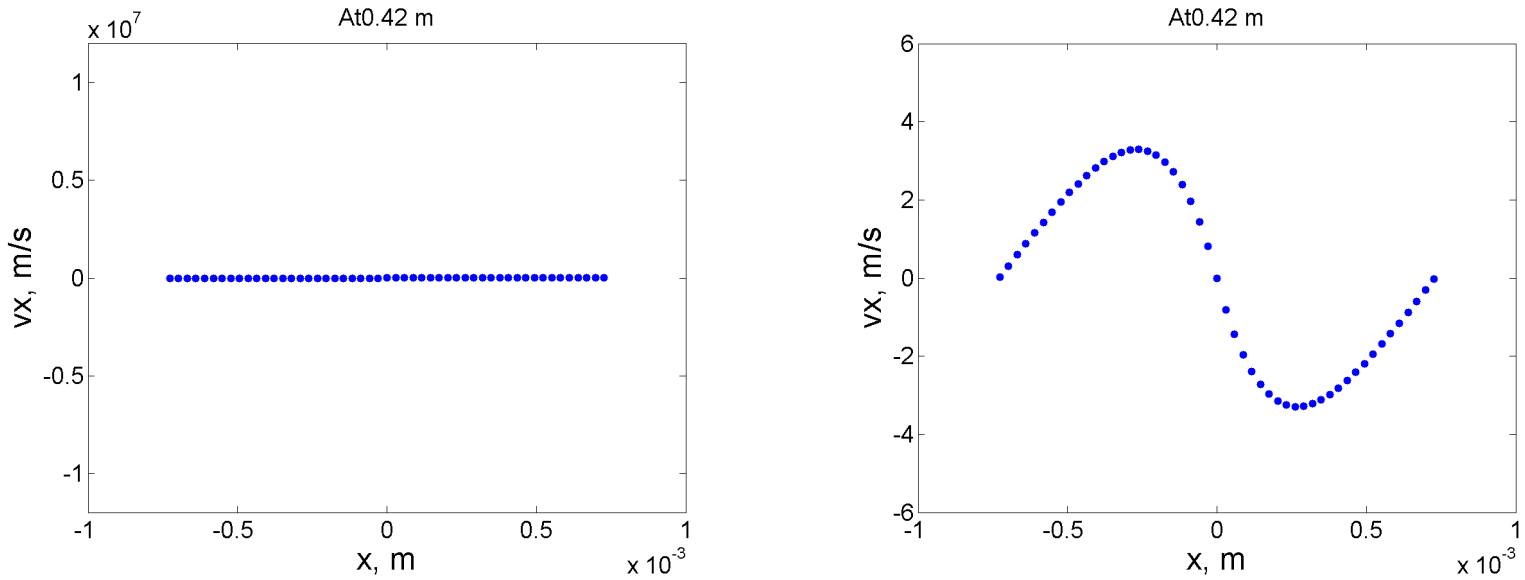


Figure: Phase before Q1 of background (left) and signal (right).

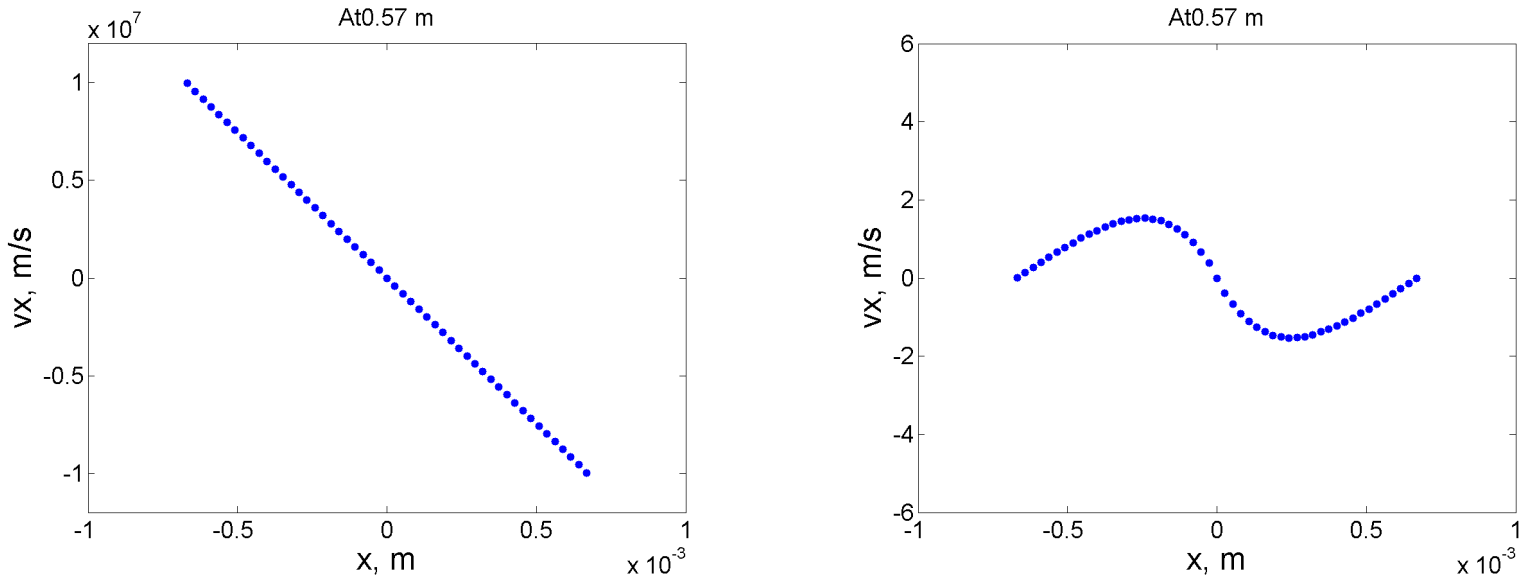


Figure: Phase after Q1 of background (left) and signal (right).

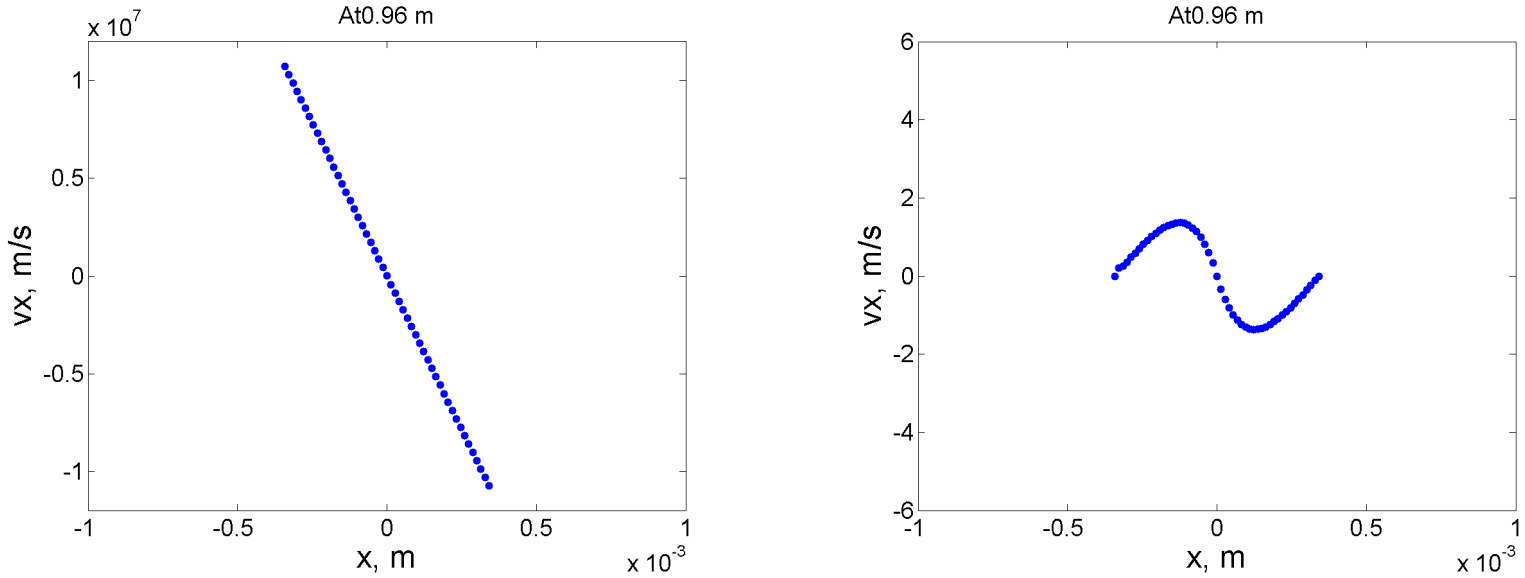


Figure: Phase before Q2 of background (left) and signal (right).

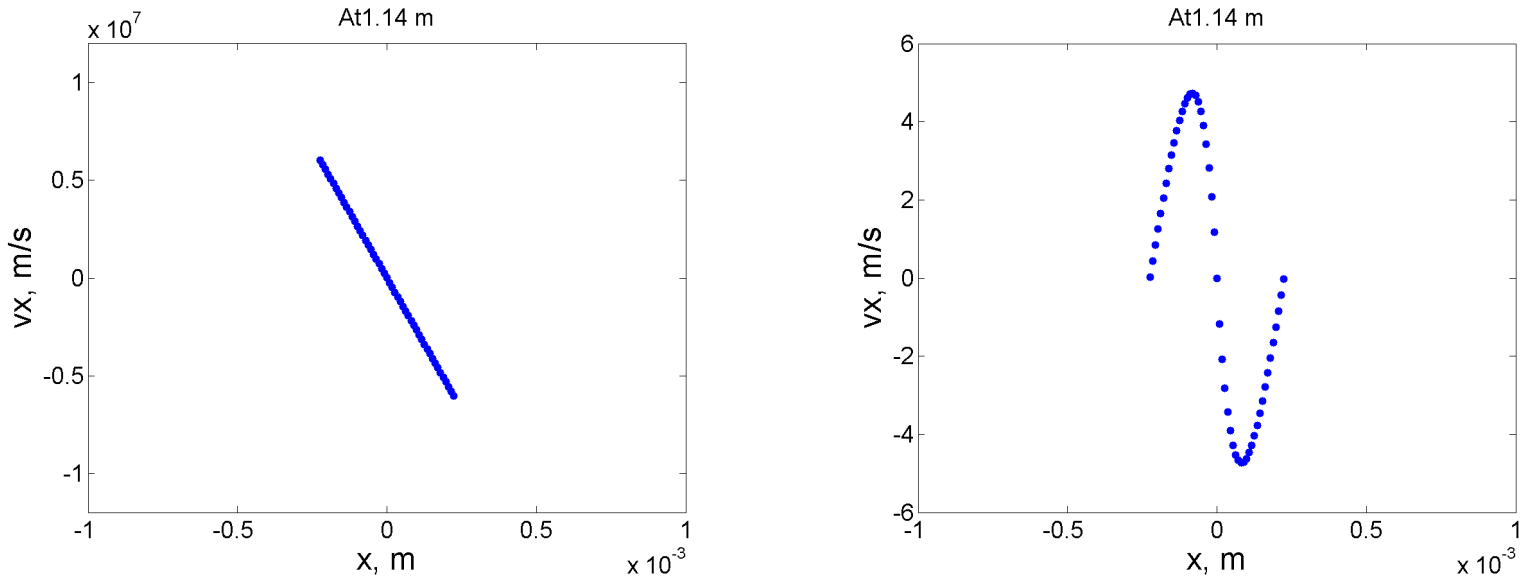


Figure: Phase after Q2 of background (left) and signal (right).

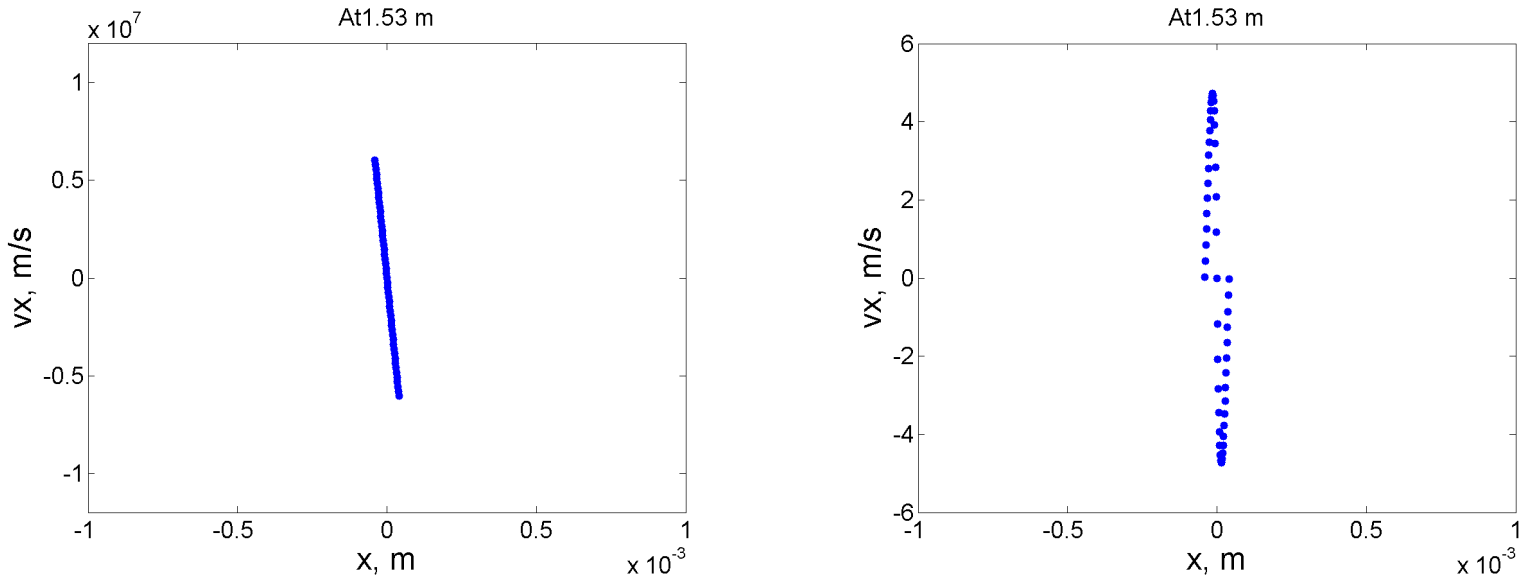


Figure: Phase before Q3 of background (left) and signal (right).

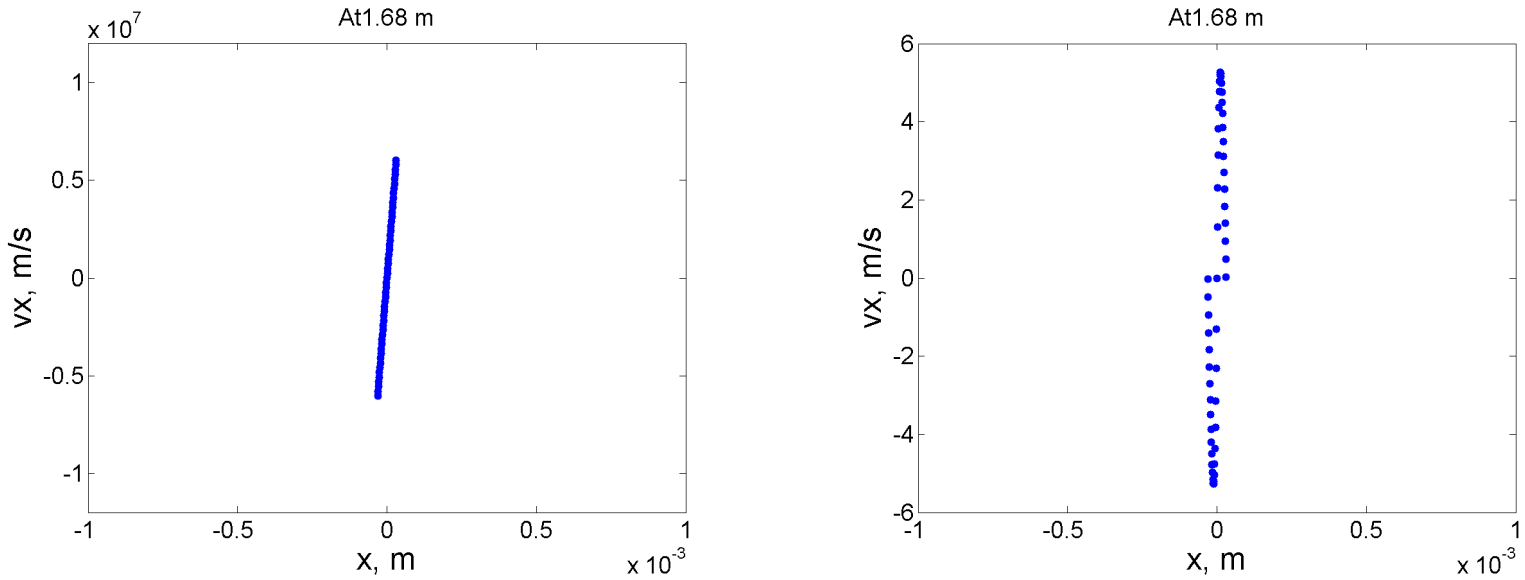


Figure: Phase after Q3 of background (left) and signal (right).

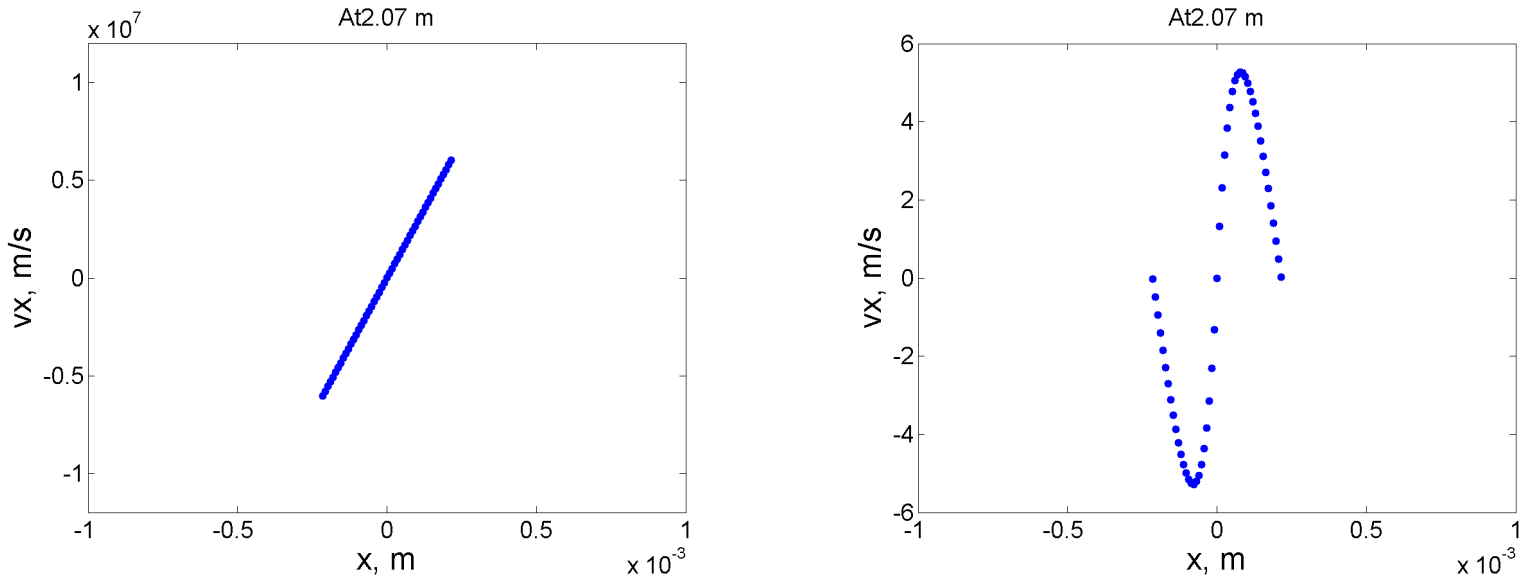


Figure: Phase before Q4 of background (left) and signal (right).

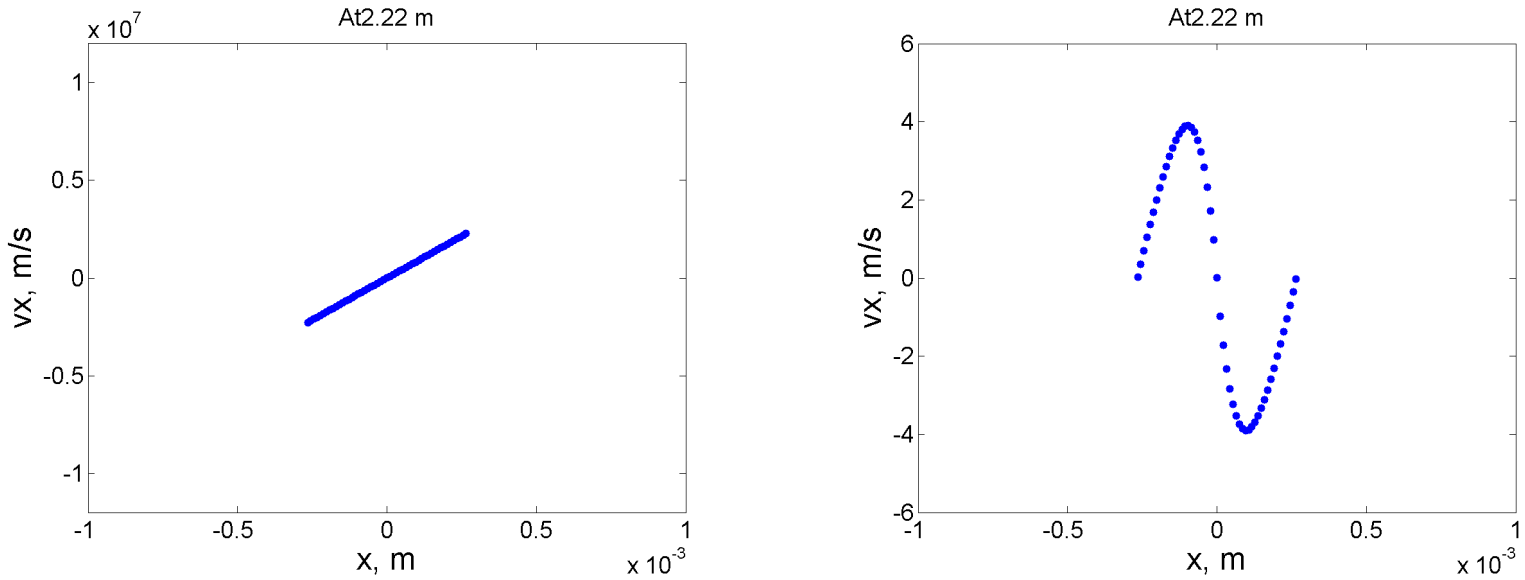


Figure: Phase after Q4 of background (left) and signal (right).

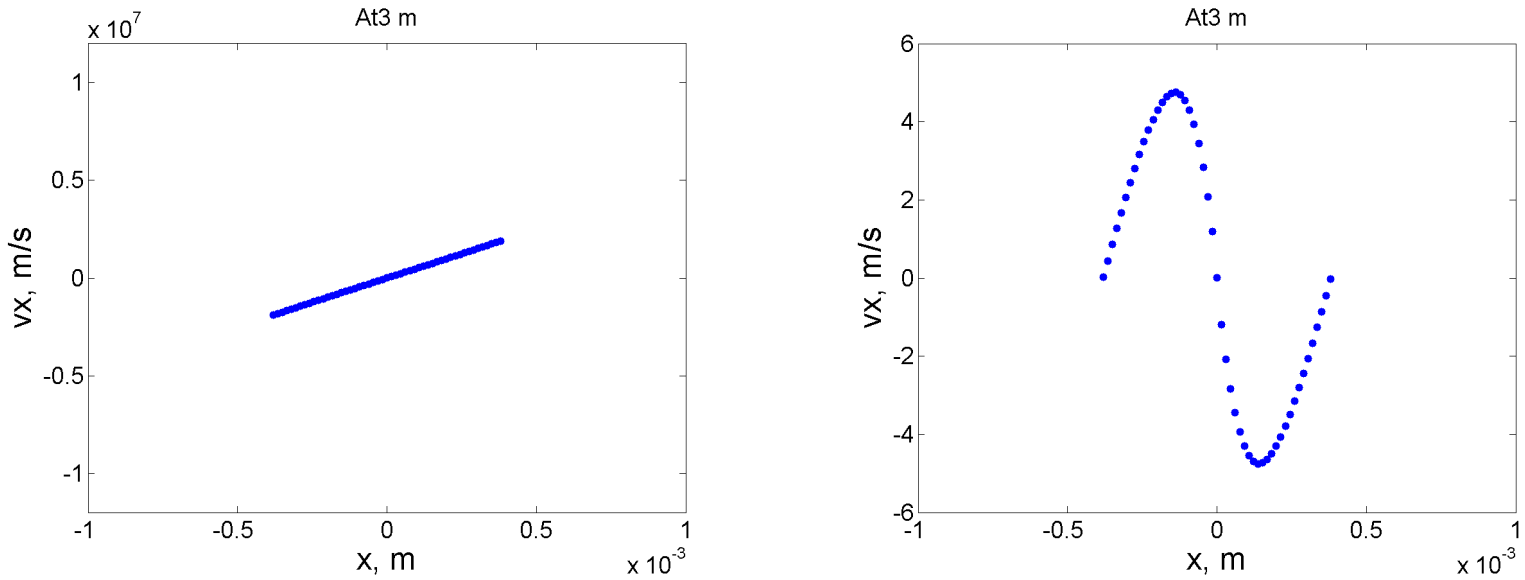


Figure: Phase at final of background (left) and signal (right).

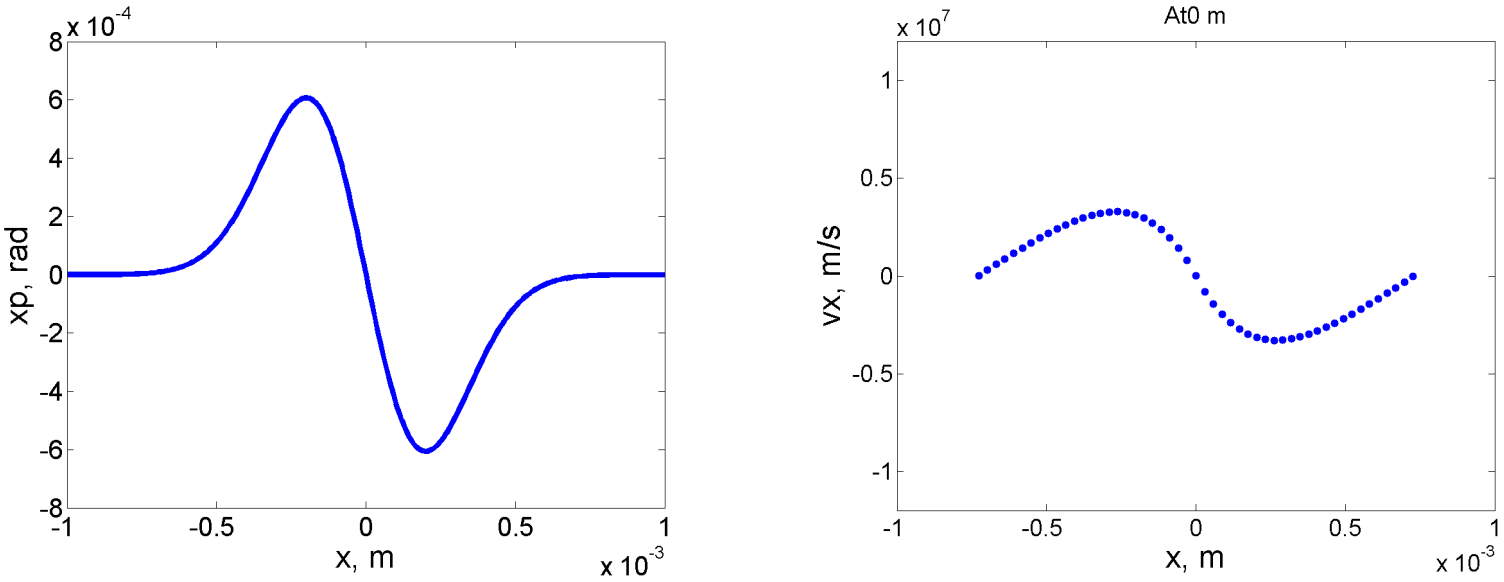


Figure: Phase at initial using transfer matrix (left) and simulation (right).

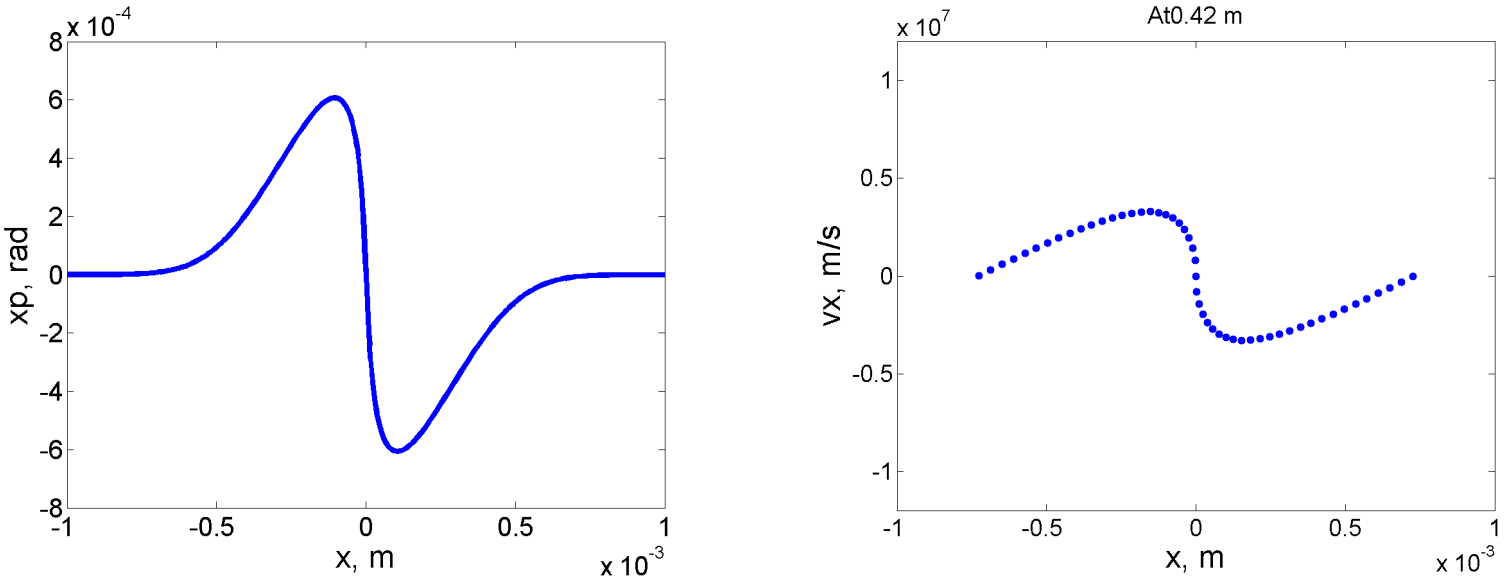


Figure: Phase before Q1 using transfer matrix (left) and simulation (right).

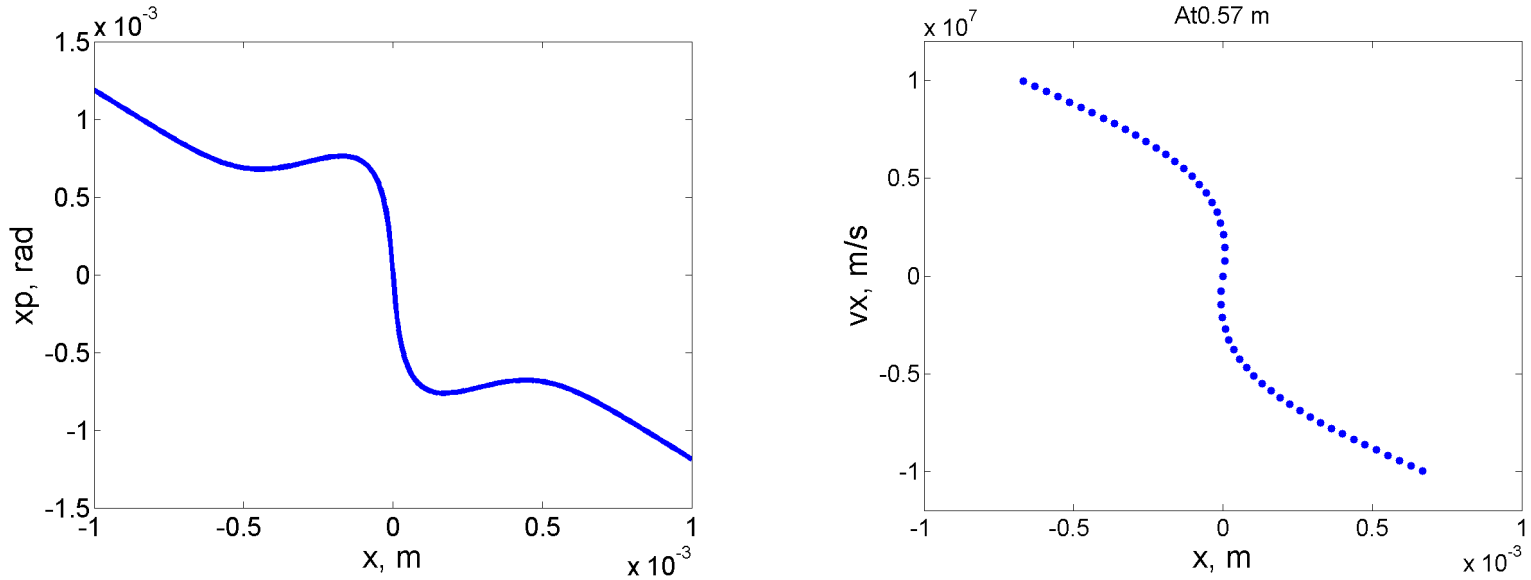


Figure: Phase after Q1 using transfer matrix (left) and simulation (right).

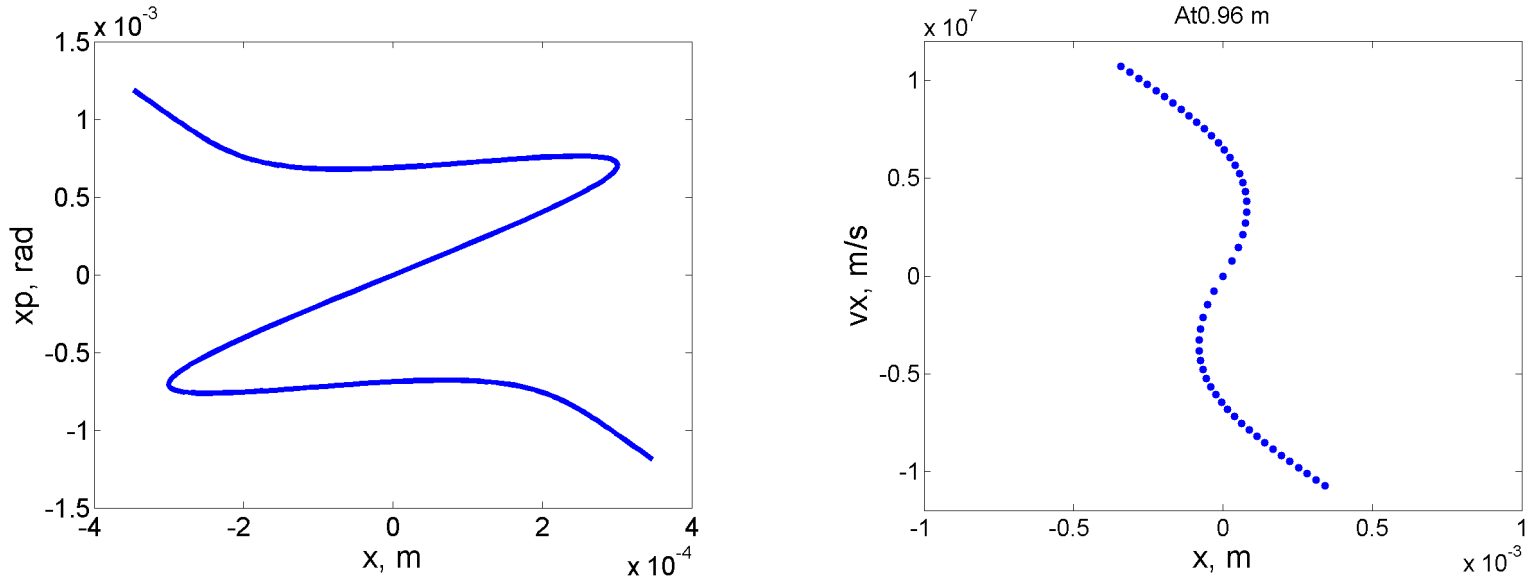


Figure: Phase before Q2 using transfer matrix (left) and simulation (right).

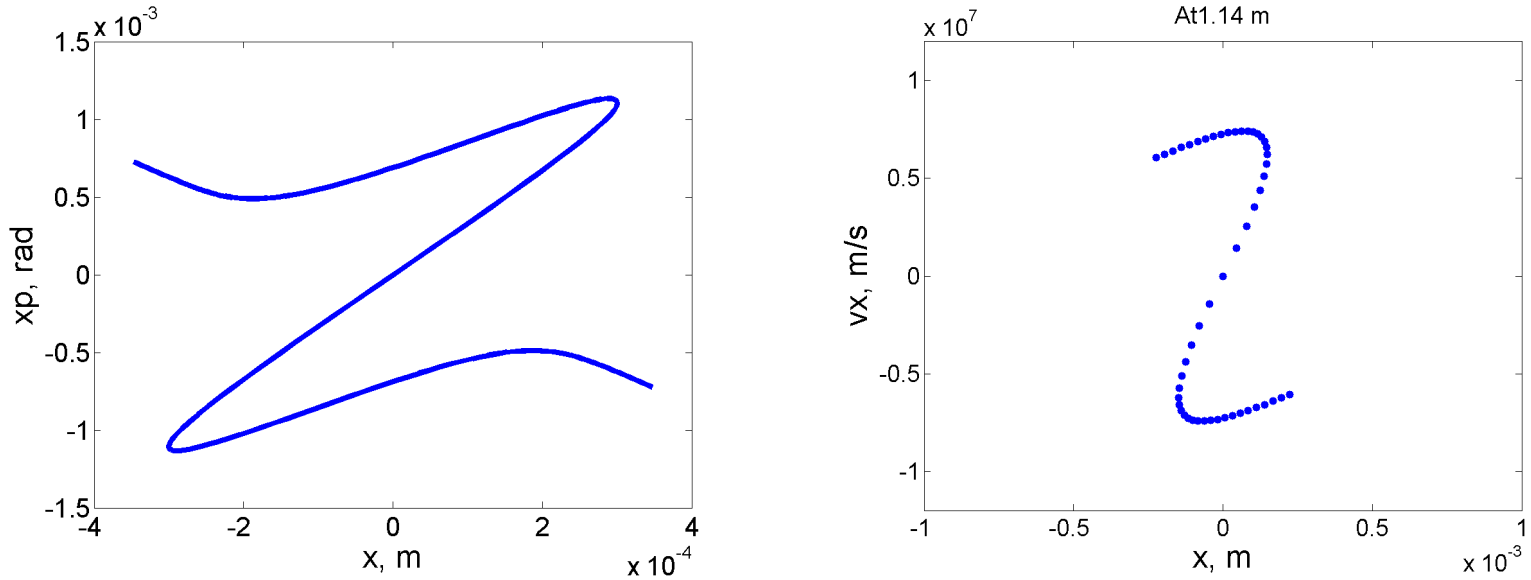


Figure: Phase after Q2 using transfer matrix (left) and simulation (right).

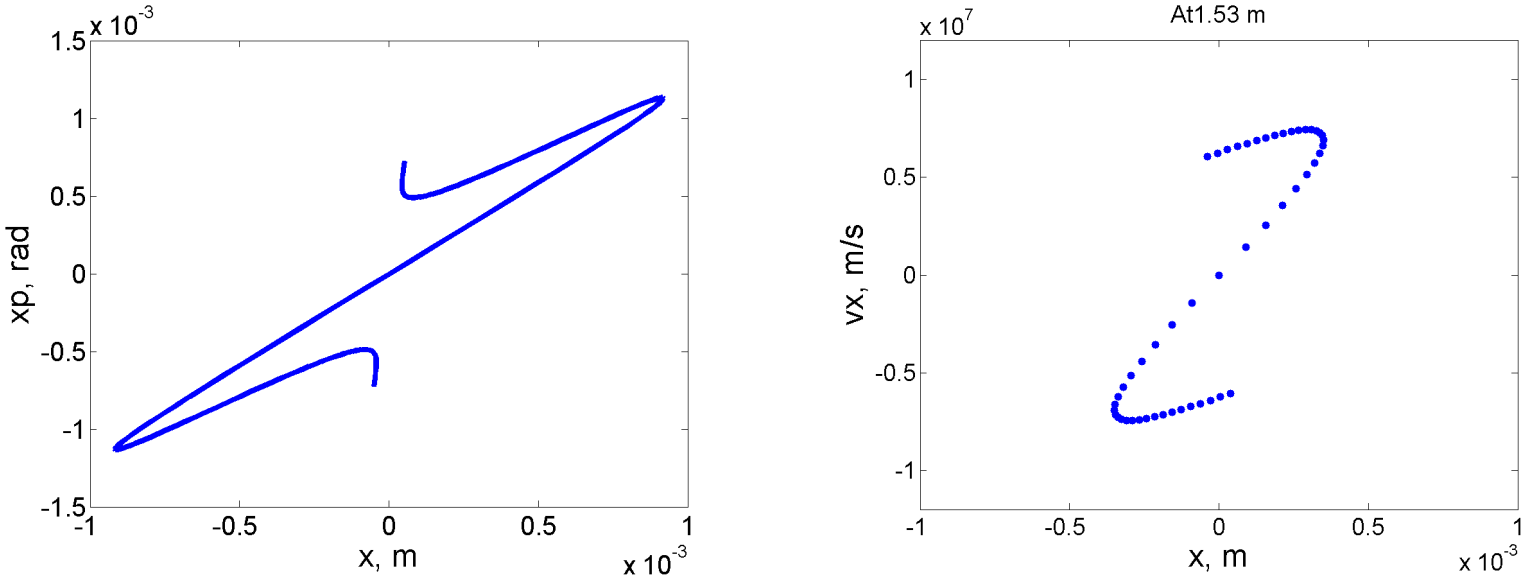


Figure: Phase before Q3 using transfer matrix (left) and simulation (right).

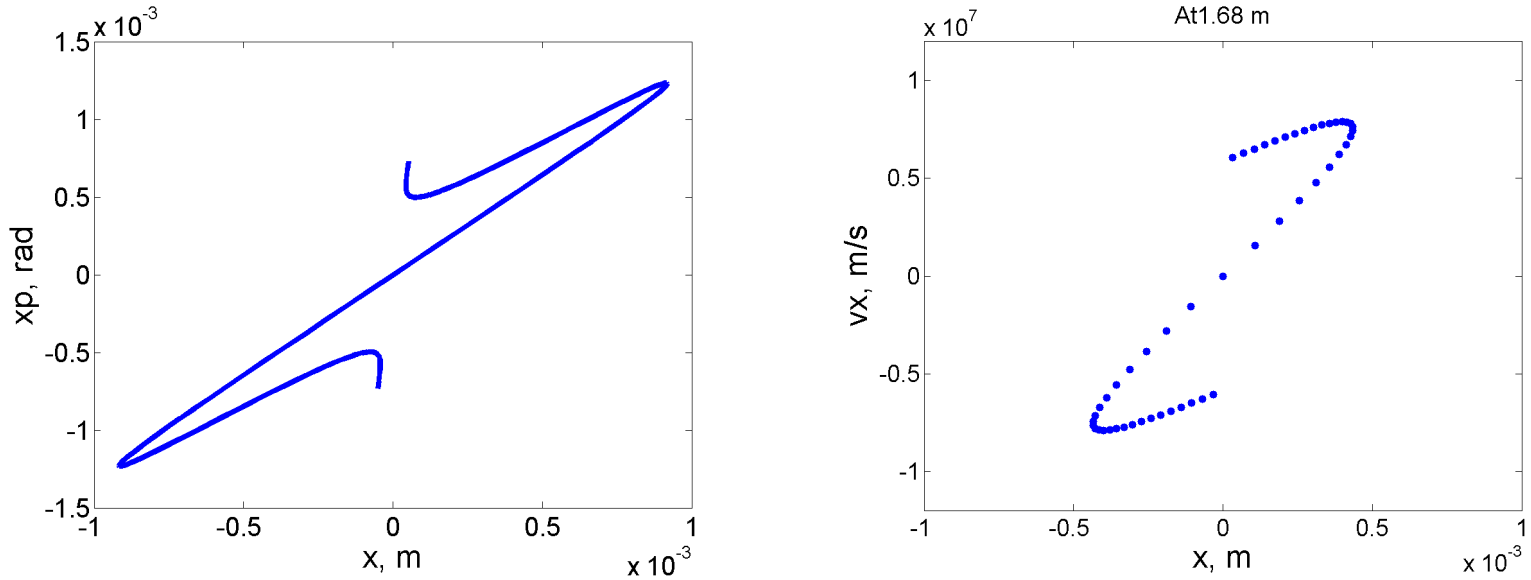


Figure: Phase after Q3 using transfer matrix (left) and simulation (right).

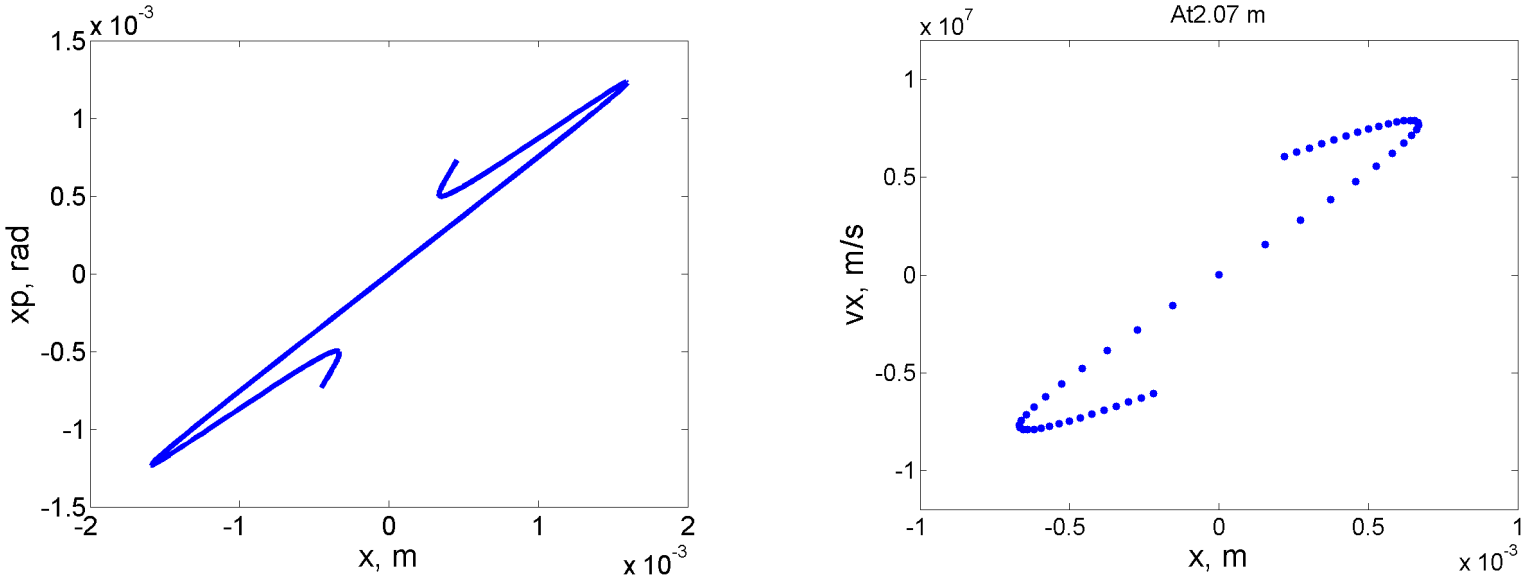


Figure: Phase before Q4 using transfer matrix (left) and simulation (right).

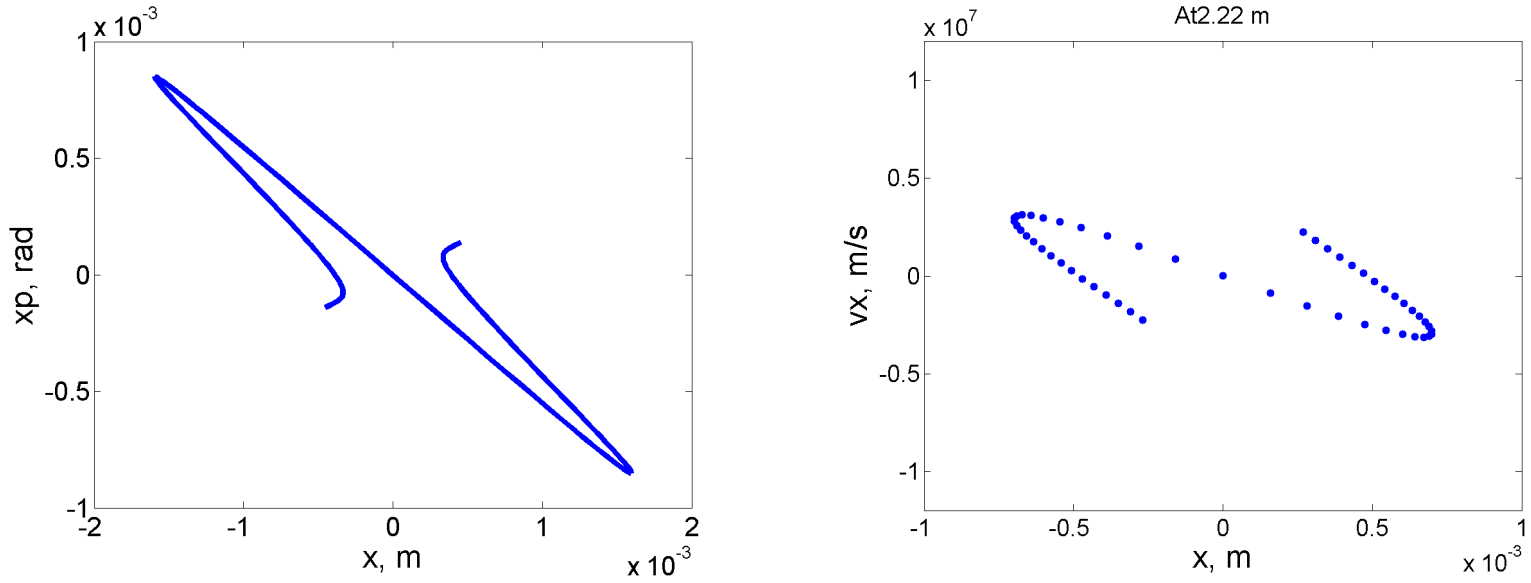


Figure: Phase after Q4 using transfer matrix (left) and simulation (right).

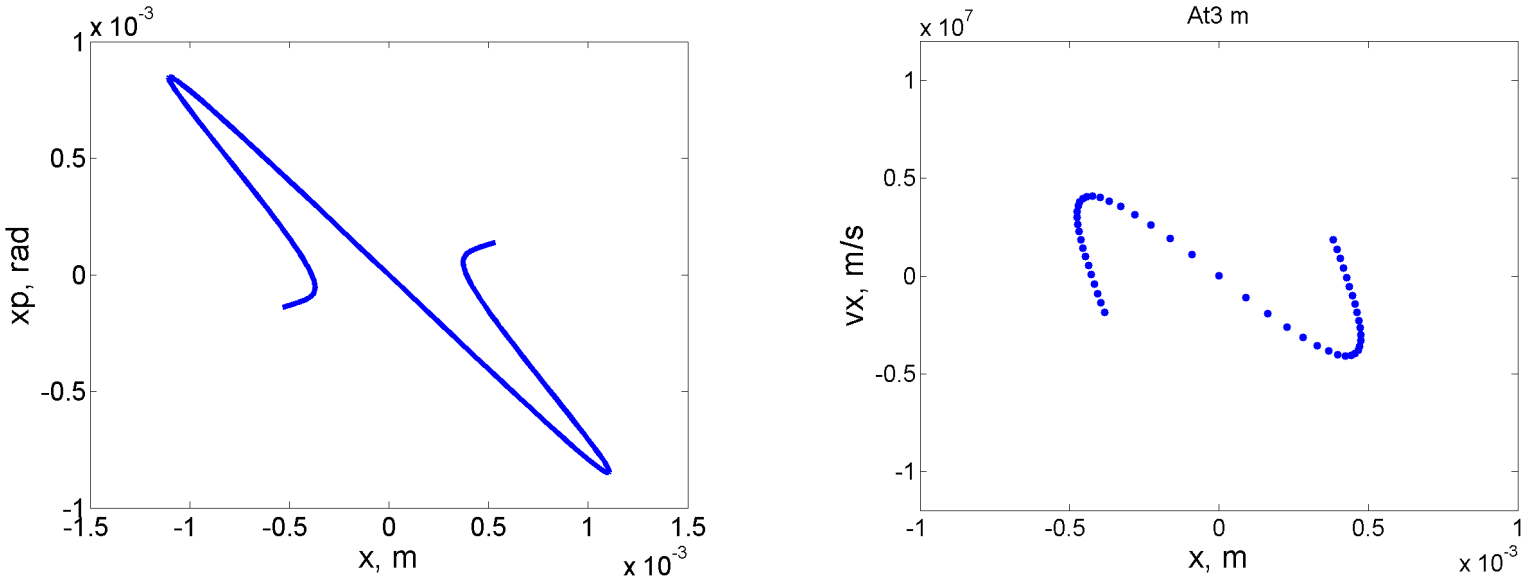


Figure: Phase at final using transfer matrix (left) and simulation (right).