Homework – 3

Problem #1

Note: Damping is considered (b=1), Lower bound on control input is taken as -2.

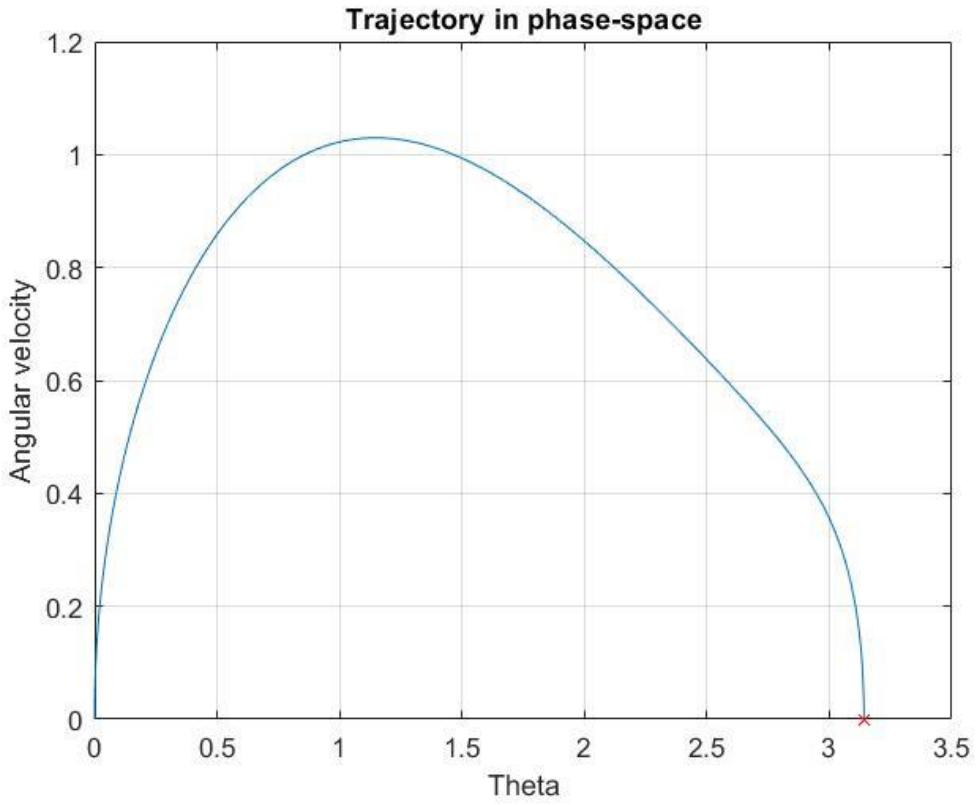

Fig 1: Trajectory followed from initial condition to final condition

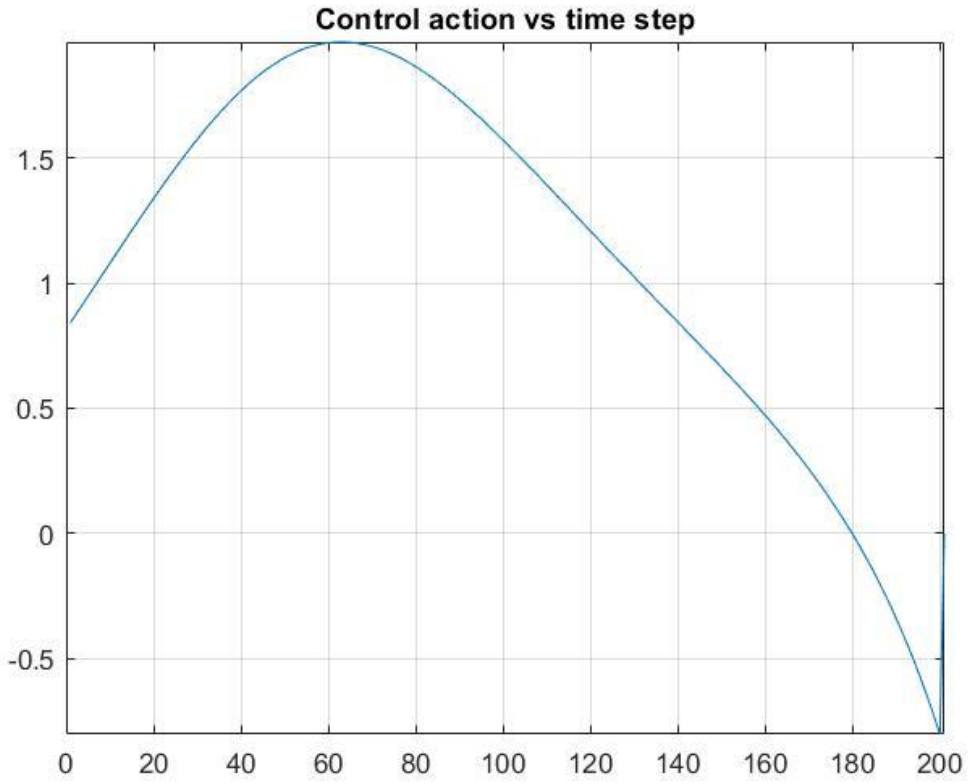

Fig 2: Control policy followed over time steps

The maximum bounds on actuator input for which the optimisation converges is (-2, 2.41).

Problem #2

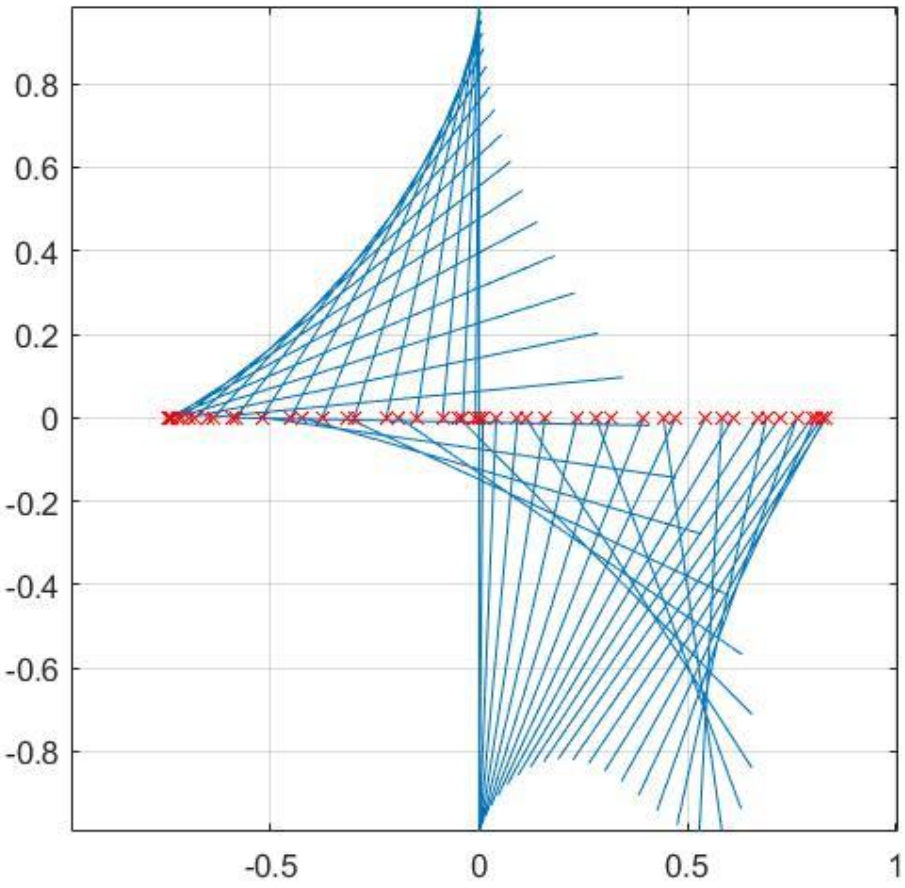

Fig 3: Motion of cart and pendulum in front view (cartesian space)

Note: Animation of cart-pole pendulum system can be found by running the code. A snapshot at the final moment is attached above.

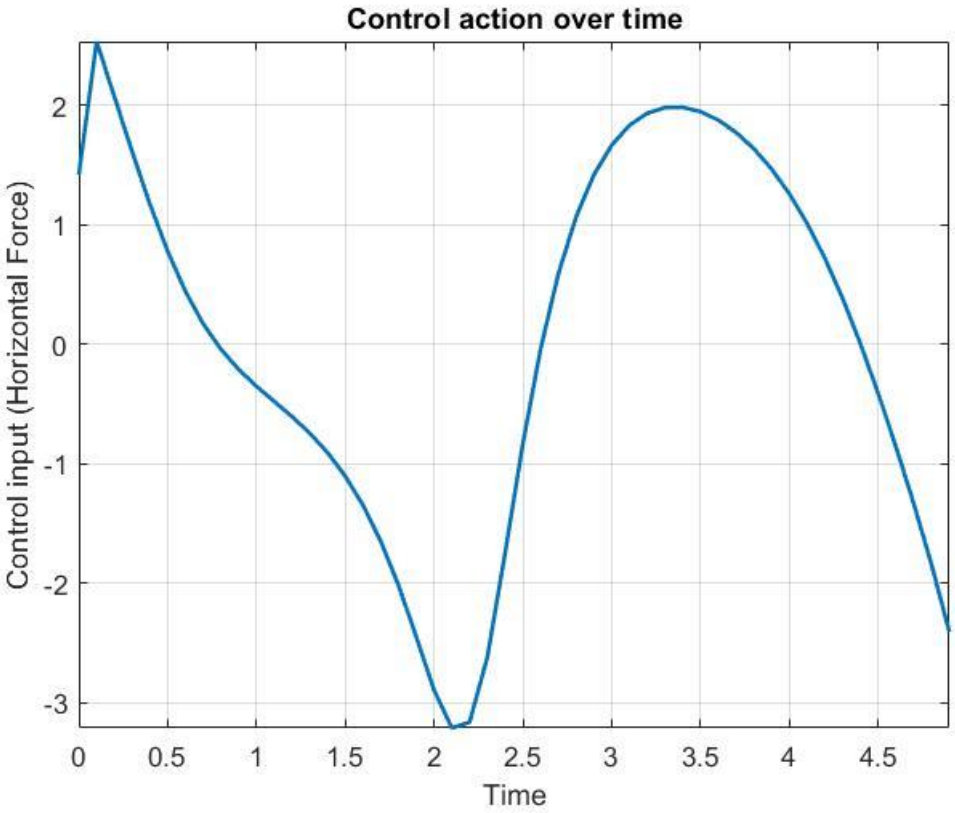

Fig 4: Control policy followed over time

Problem #3

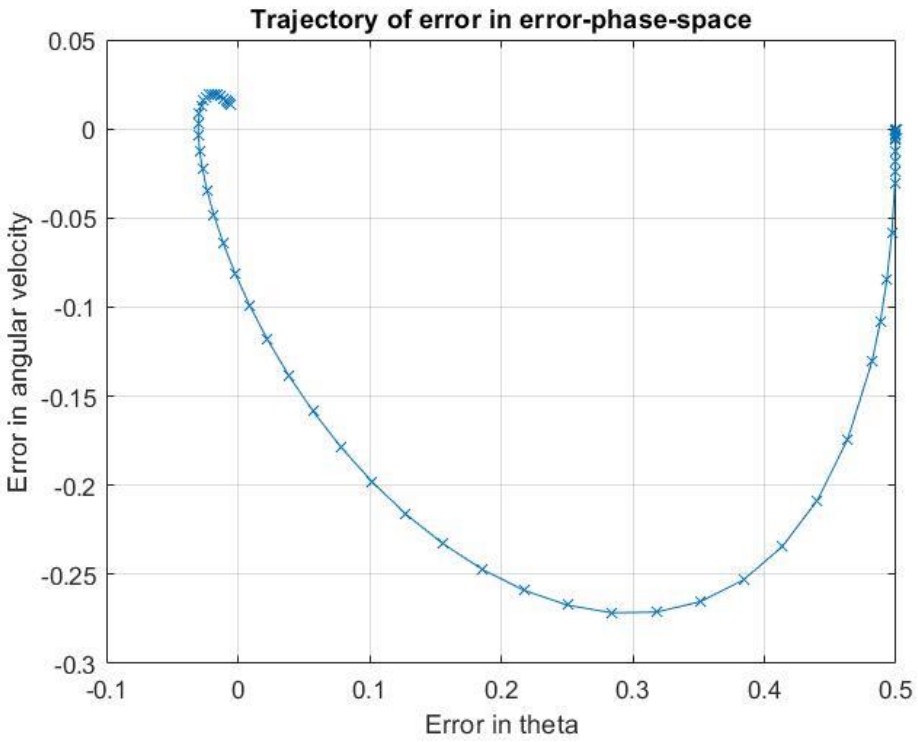

Fig 5: Trajectory of error in the transformed coordinates phase-space

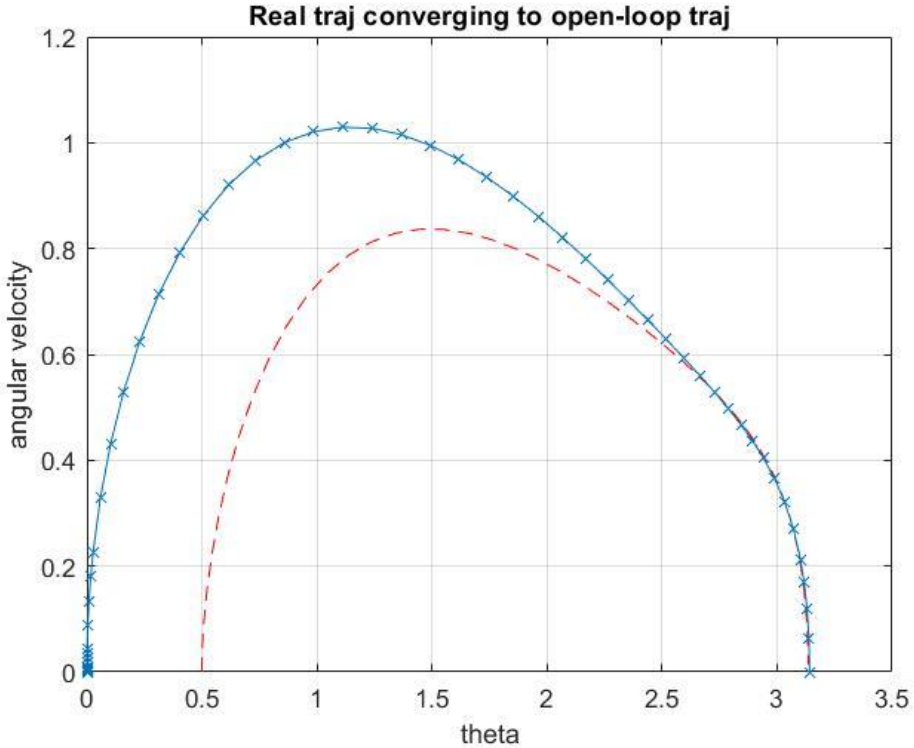

Fig 6: Original coordinate frame phase-plot

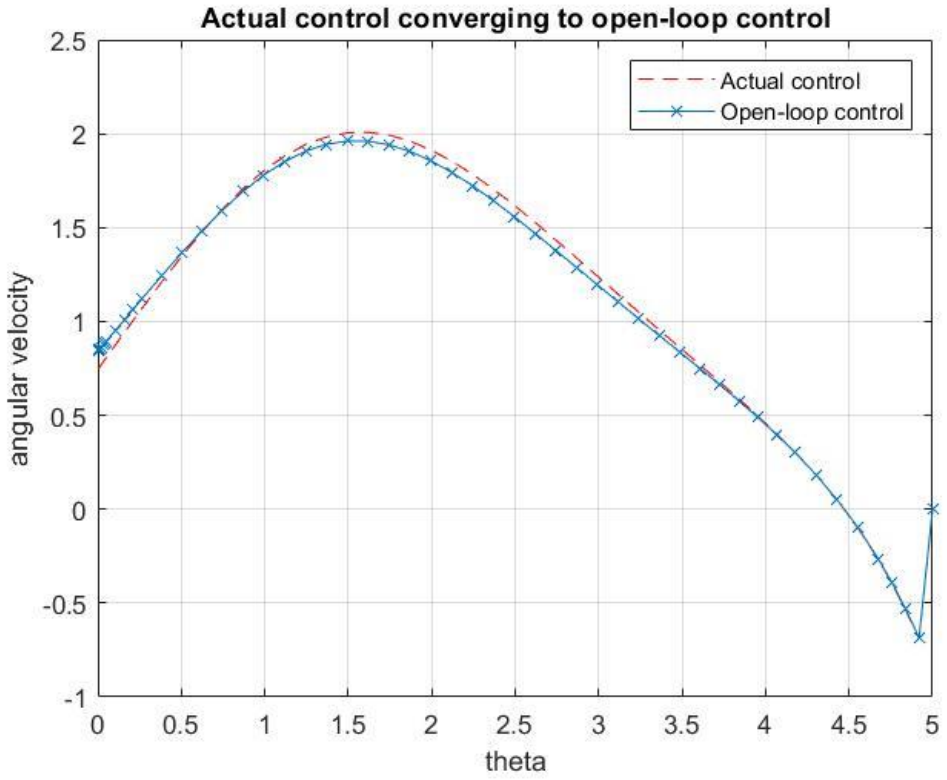

Fig 7: Control action in original phase-space