Thesis Progress Report #1

Identifying the controllers with VRFT

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The Quad-Copter Model

```
1  Iyy = 34.7e-3;     % kg m^2
2  dM_q = -46.3e-3; % N m s
3  dM_u = 15e-3;      % Nms
4
5  A = [1 / Iyy * dM_q,   0;
6       1                ,   0 ];
7  B = [1 / Iyy * dM_u; 0];
8  C = [1 0];
9  D = 0;
10
11 PitchRateModel = ss(A, B, C, D, ...
12      'InputName', 'Delta Omega', ...
13      'OutputName', 'Pitch Rate (q)');
14
15 Mixer = dM_u^-1;
```

Closing the loop

```
1  Tf = .01; % cf. p87 (Bottom right)
2
3  Ro = pid(.3, 0, .3, Tf);
4  Ri = pid(.05, 1.61, .00512, Tf);
5
6  InnerLoop = loopsens(...
7      PitchRateModel * Mixer, Ri);
8  InnerReferenceModel = tf(InnerLoop.Ti);
9
10 integrator = tf(1, [1 0]);
11 OuterLoop = loopsens(...
12     integrator * InnerReferenceModel, Ro);
13 OuterReferenceModel = tf(OuterLoop.Ti);
```

Model Verification

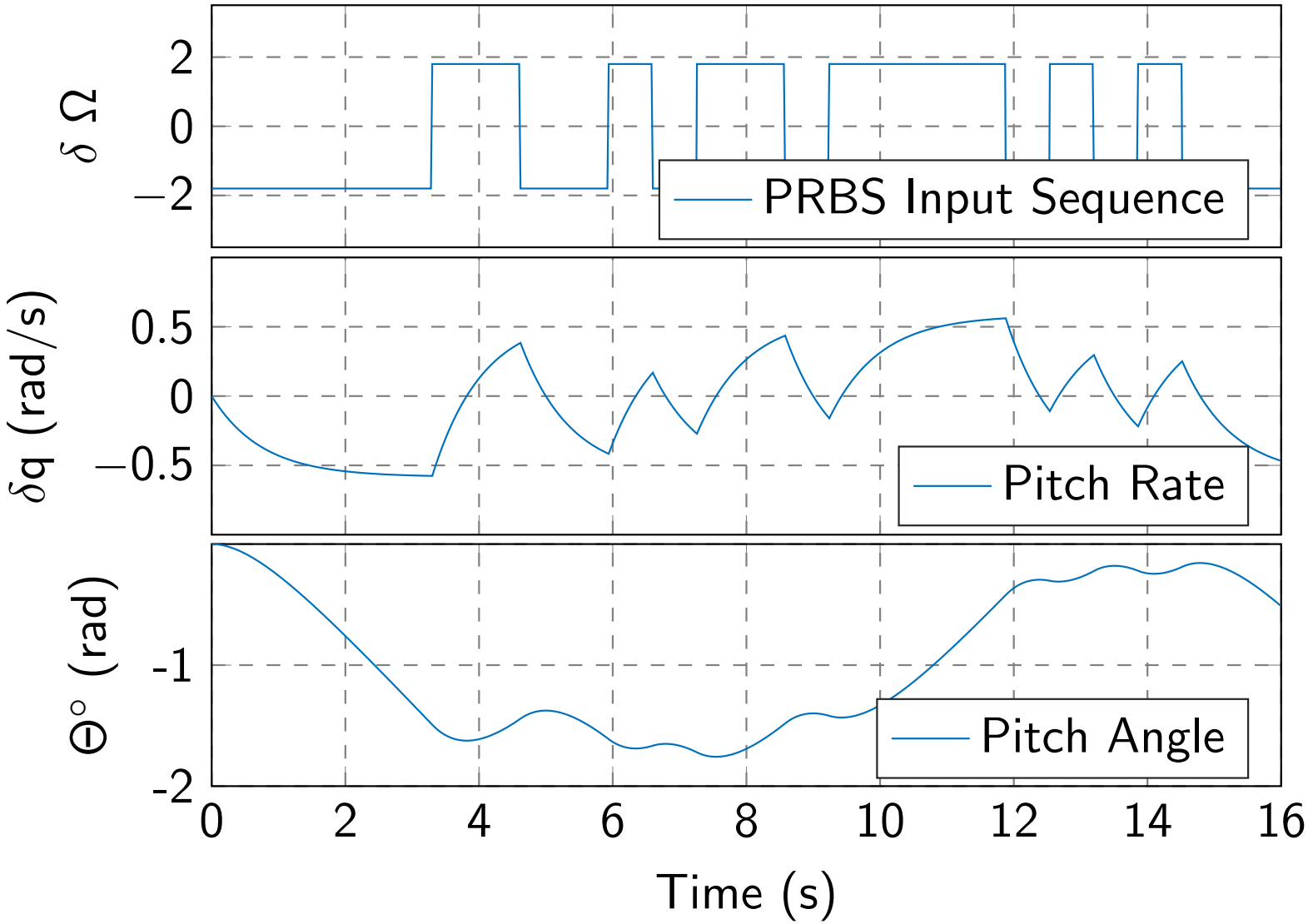


Figure: Pith rate and pitch angle when the `PitchRateModel` is fed a PRBS sequence guessed from figure 6.6 (p80).

Closed loop behavior

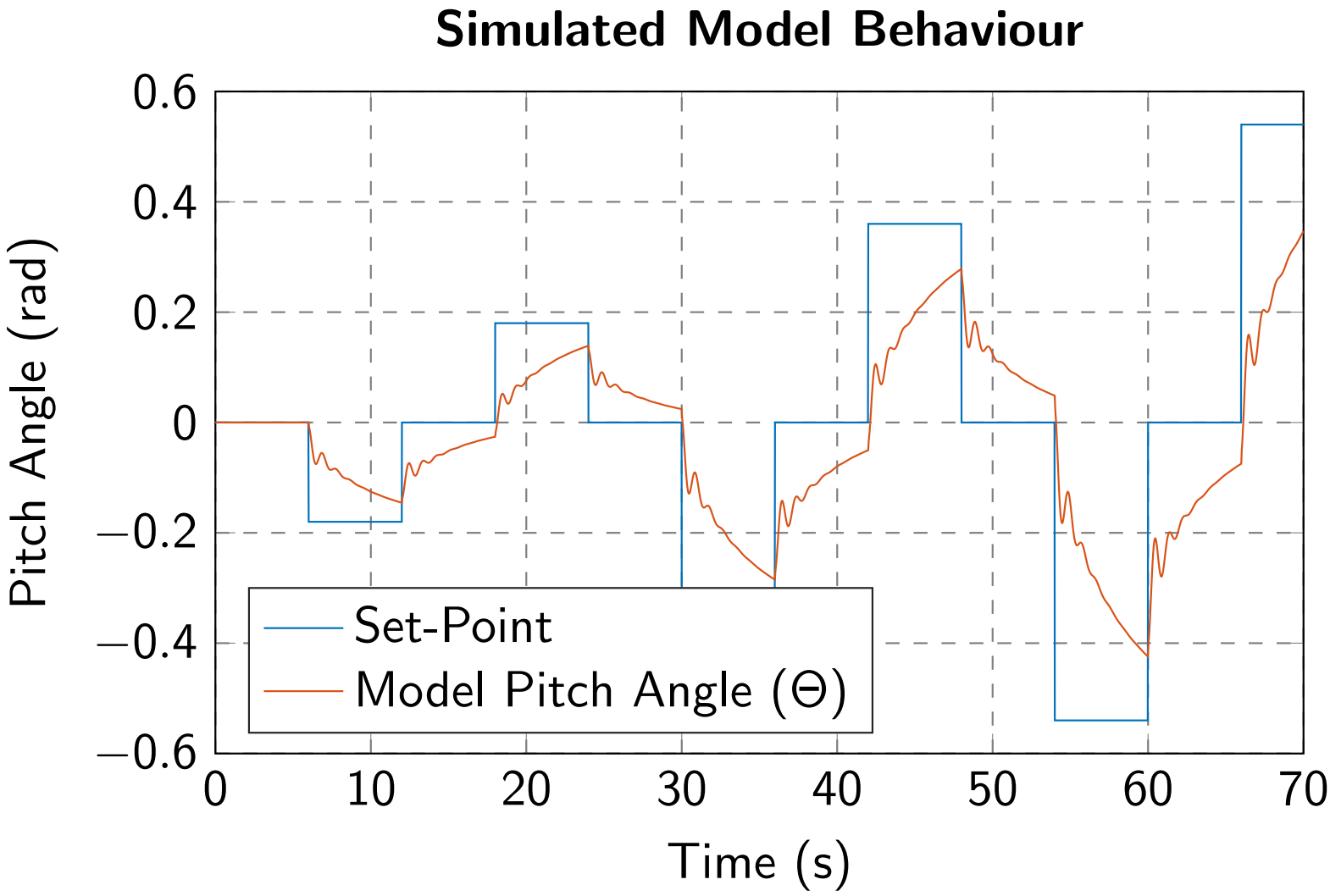
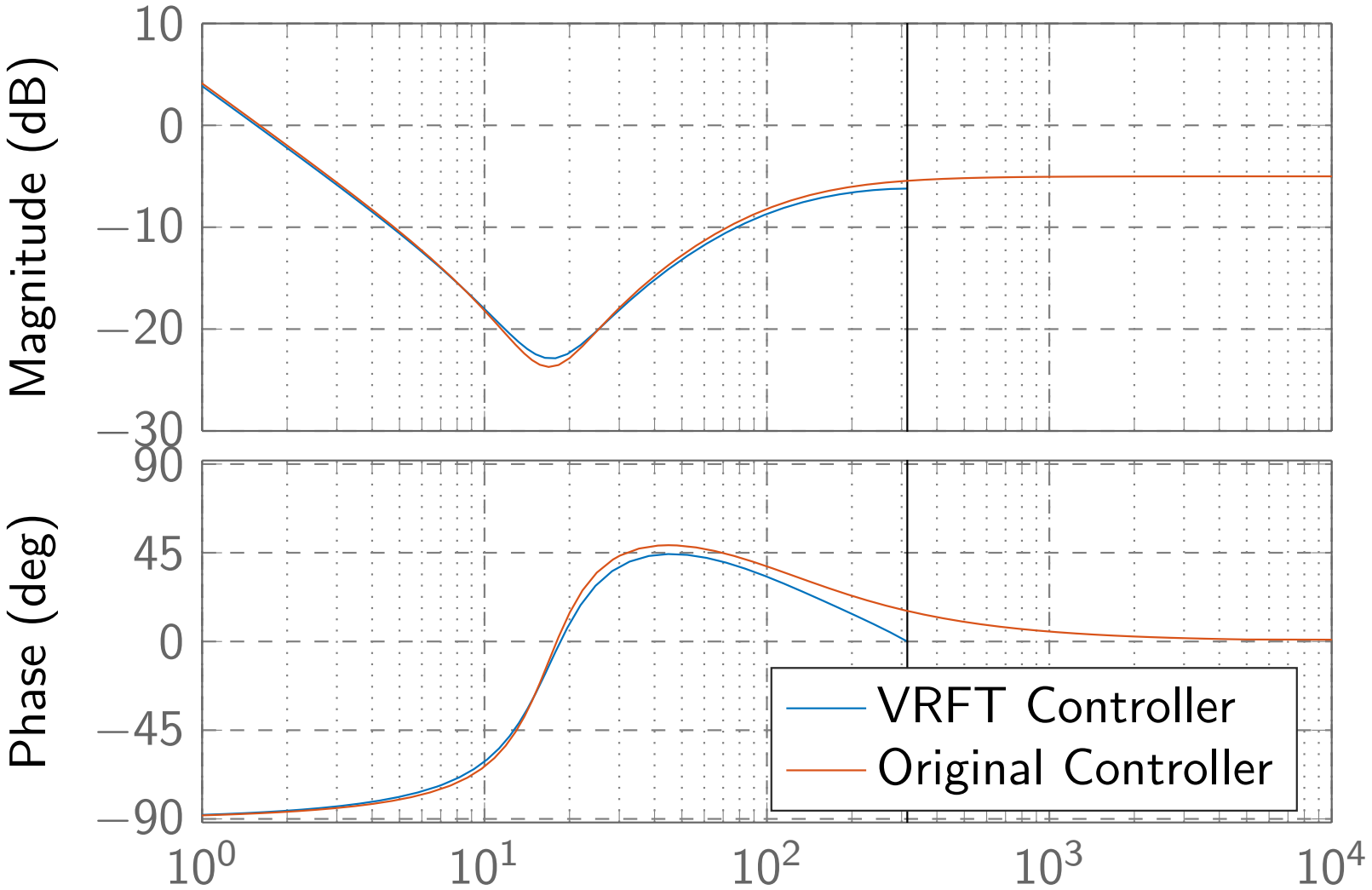


Figure: Closed loop behavior of the system using the original controllers.

VRFT Results - Inner Controller

The code here is omitted since it produces correct results and is longer.



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