

Assignment 3, TTK4190

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Contents

1	Autopilot design	2
1.1	Heading autopilot	2
1.2	Speed autopilot	2
2	Path following and Path tracking	3
2.1	Path Generation	3
2.2	Path following	3
2.3	Path Tracking	3

1 Autopilot design

1.1 Heading autopilot

Her skriver vi om Heading autopilot

1.2 Speed autopilot

To control the surge speed of MS Fartøystyring we suggest using a linearized model, where the surge speed is decoupled from the rest of the system. We are assuming

$$u \gg v$$

which leads to the conclusion that

$$U = u$$

. We then use a forward speed model from the 3DOF Momoto model

$$(m + X_{\dot{u}})\dot{u} - X_u u_r - X_{|u|u}|u_r|u_r = \tau \quad (1)$$

which leads to

$$\dot{u} = \frac{\tau + X_{|u|u}|u_r|u_r + X_u u_r}{m - X_{\dot{u}}} = \frac{X_{|u|u}|u_r|u_r + X_u u_r}{m - X_{\dot{u}}} + \tau_{nl} \quad (2)$$

where

$$\tau_{nl} = \frac{\tau}{m - X_{\dot{u}}} \Rightarrow \tau = \tau_{nl}(m - X_{\dot{u}}) \quad (3)$$

2 Path following and Path tracking

2.1 Path Generation

Her skriver vi om Path generation

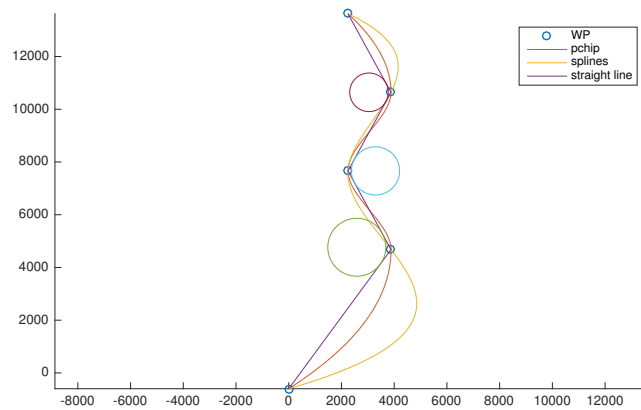


Figure 1: Different trajectories

2.2 Path following

Her skriver vi om Path following

2.3 Path Tracking

Her skriver vi om Path tracking