電機械固態控制

Assignment #5

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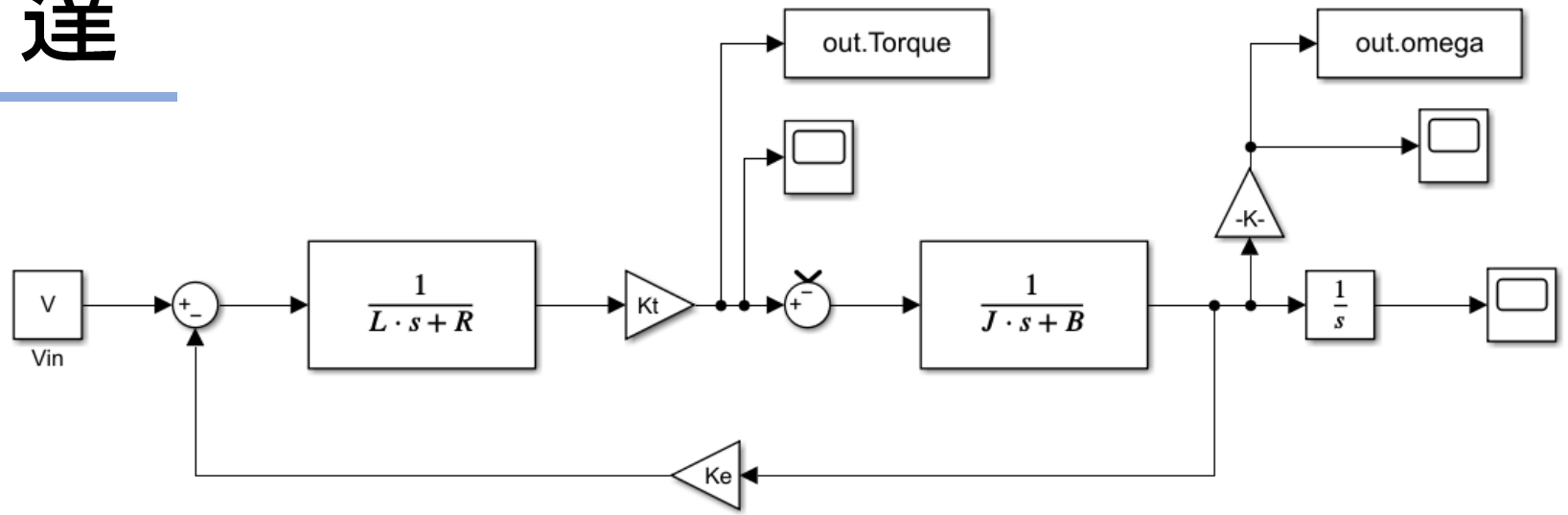
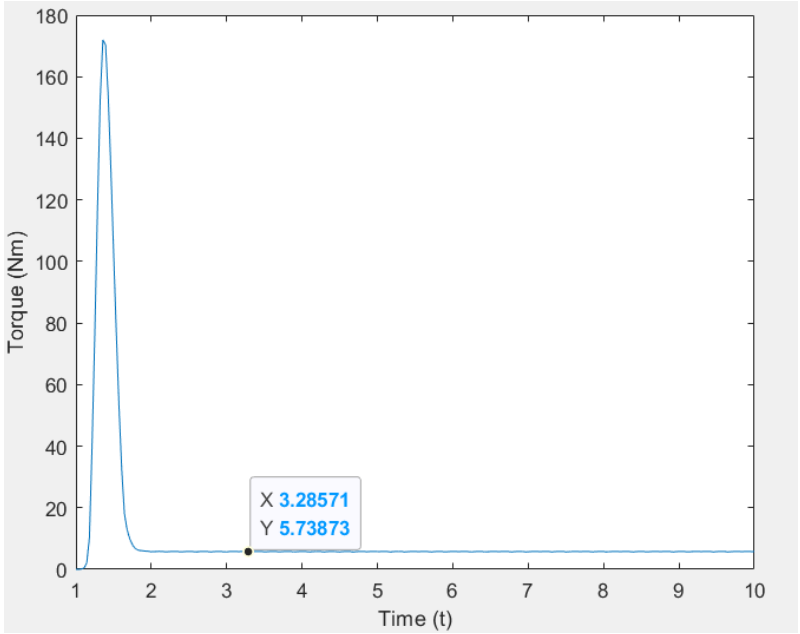
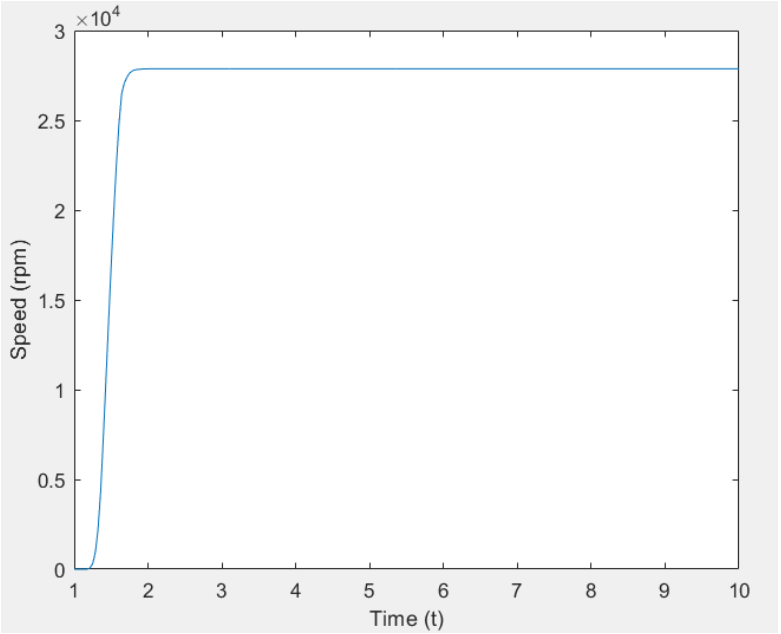
Date：2022 / 11 / 1

DC 馬達



Parameters		
V	V	300
K_T	N·m/A_{pk}	0.1
K_E	V_{pk}·s/rad	0.1
L	mH	1.5
R	mΩ	140
J_m	kg·m^2	0.006
B	N.m.s/rad	0.002

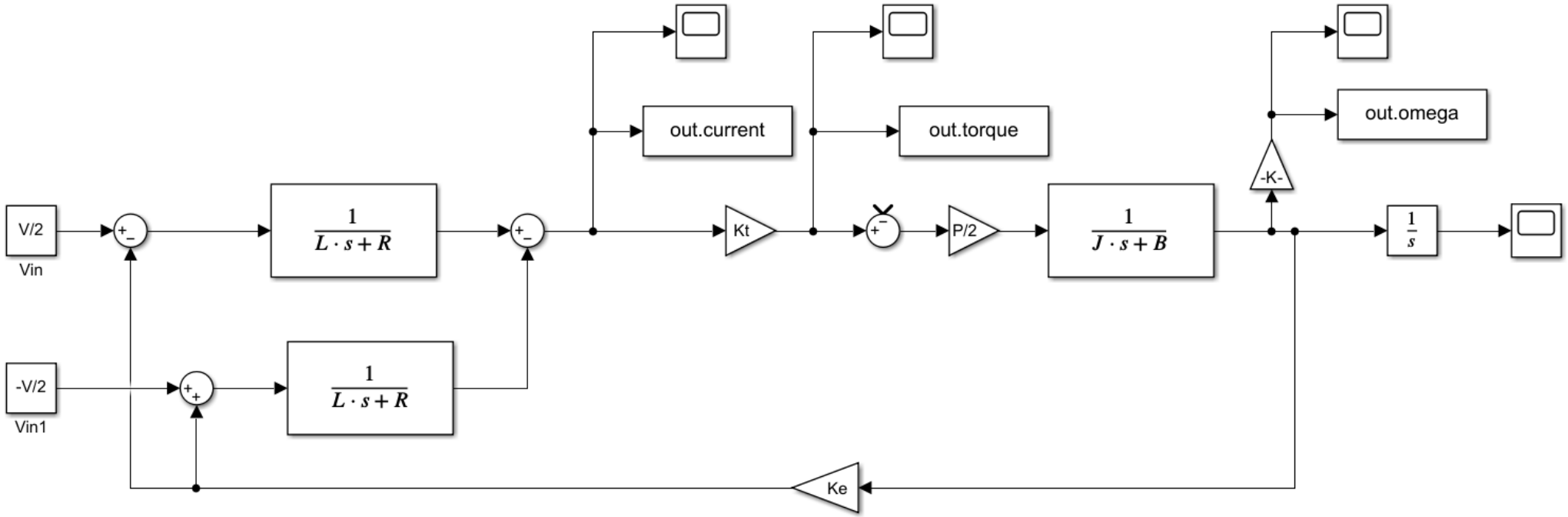




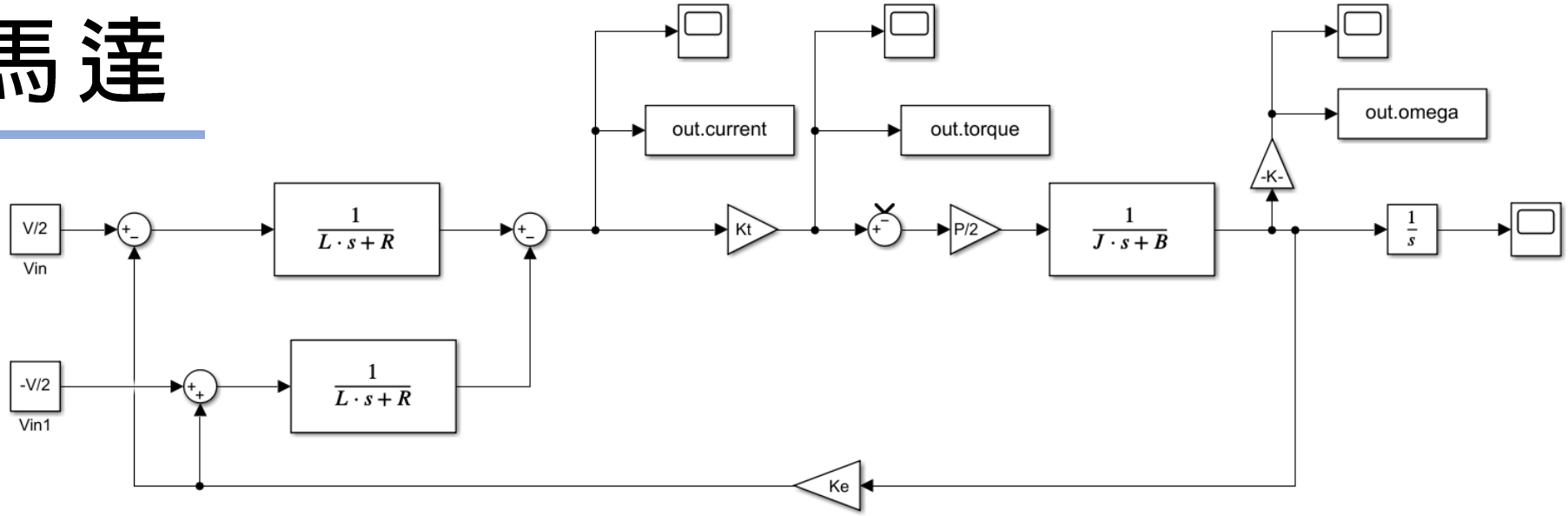
三相馬達

模型建立以120度導通六步方波理想狀態下，僅導通馬達的兩相線圈來激磁，且輸出保持穩定。

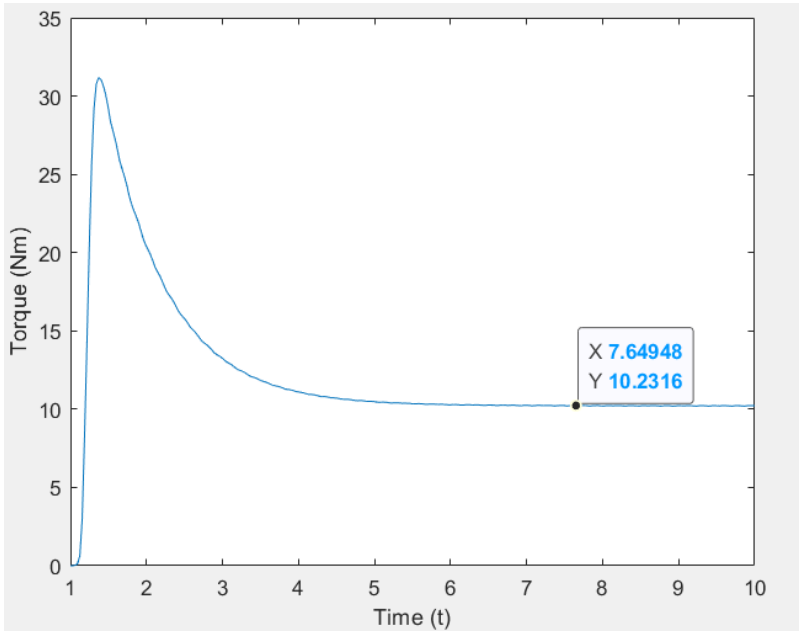
透過改變馬達各項參數值(L、R、Ke、Kt、B)，討論其對於輸出轉速與轉矩之影響。

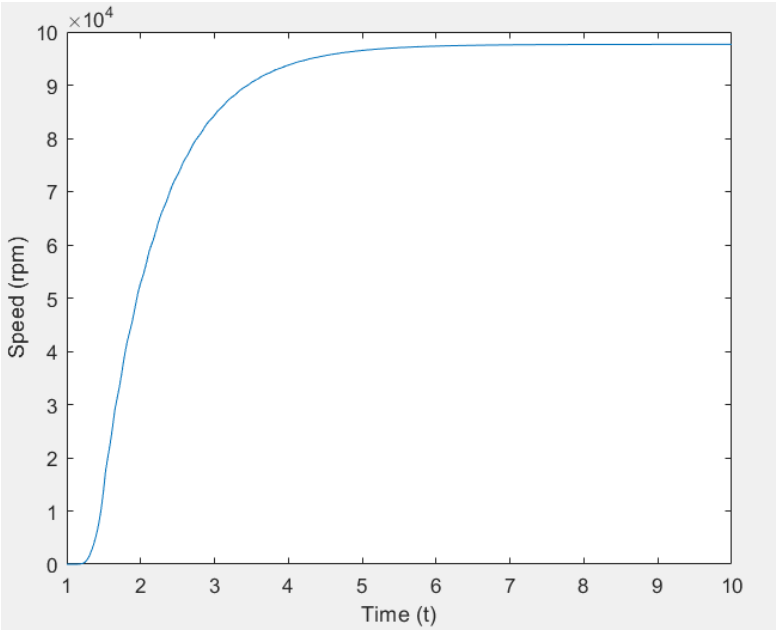


三相馬達



Parameters		
V	V	300
K_T	N·m/A_{pk}	0.01
K_E	V_{pk}·s/rad	0.01
L	mH	1.5
R	mΩ	140
J_m	kg·m^2	0.006
B	N.m.s/rad	0.002

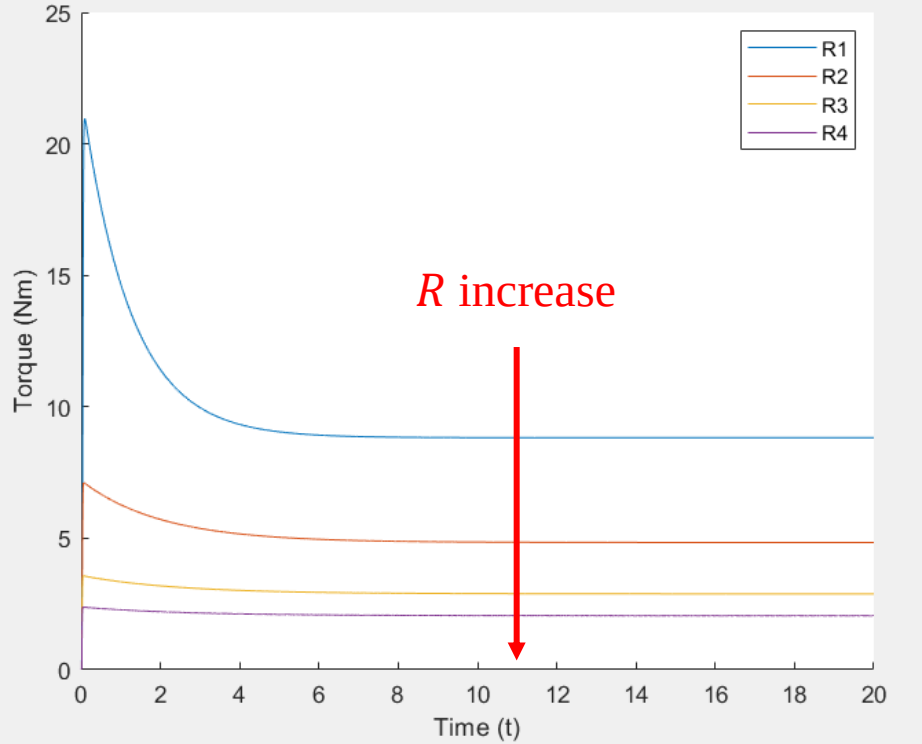




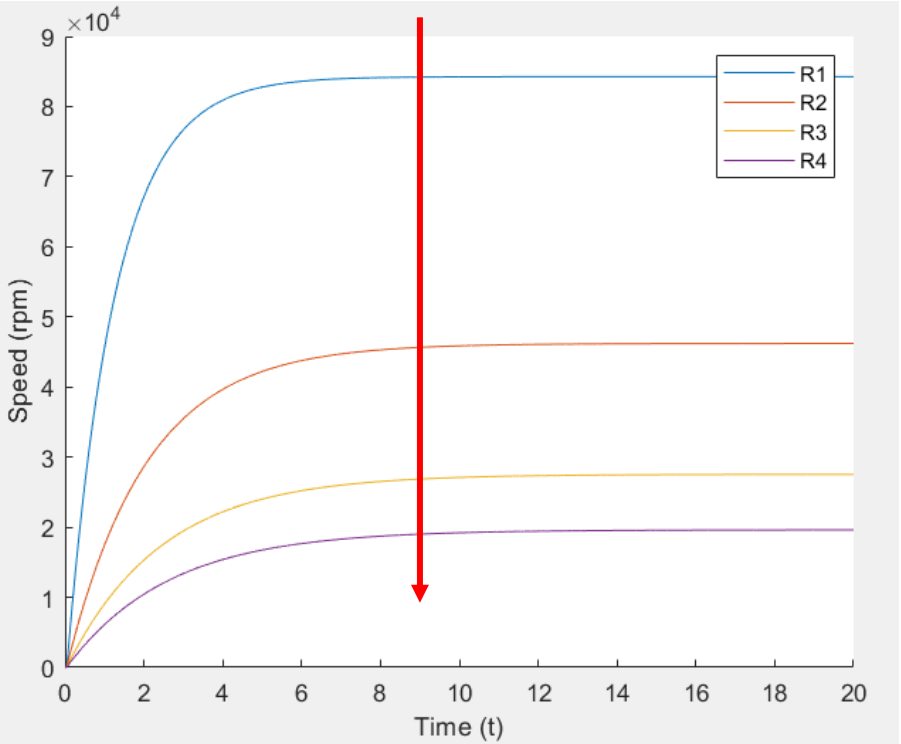
參數變化對轉速轉矩之影響

$R\uparrow \Rightarrow I\downarrow , T\downarrow , \omega\downarrow$

Resistance (mΩ)	
R_1	140
R_2	420
R_3	840
R_4	1260



Torque

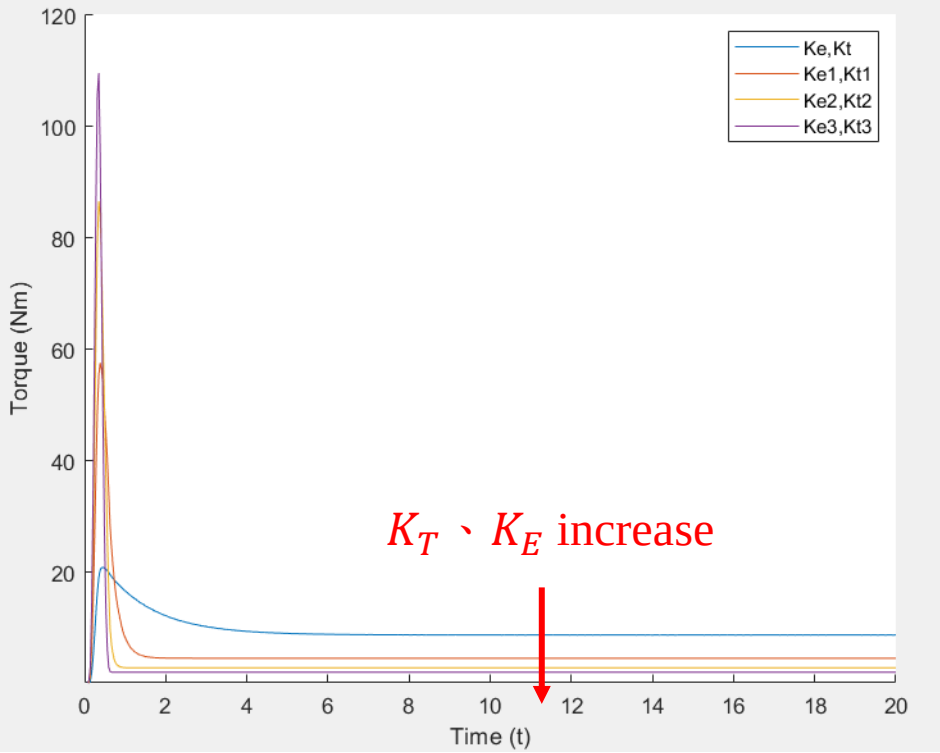


Speed

參數變化對轉速轉矩之影響

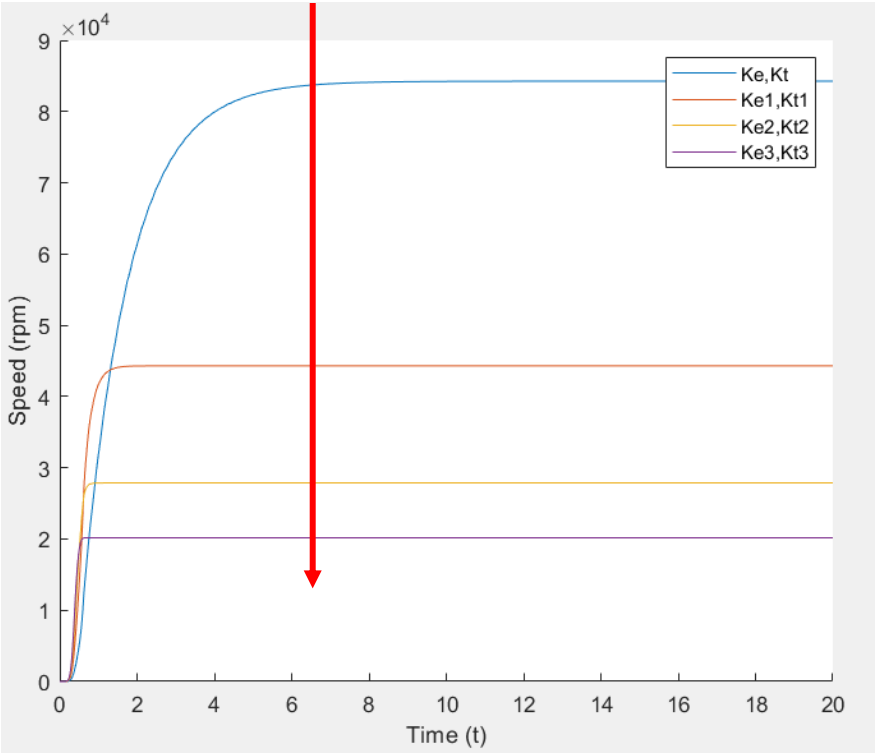
K_T 、K_E ↑⇒ I↓ , T↓ , ω↓

K_T 、K_E	0.01
K_{T1} 、K_{E1}	0.03
K_{T2} 、K_{E2}	0.05
K_{T3} 、K_{E3}	0.07



Torque

K_T 、K_E increase



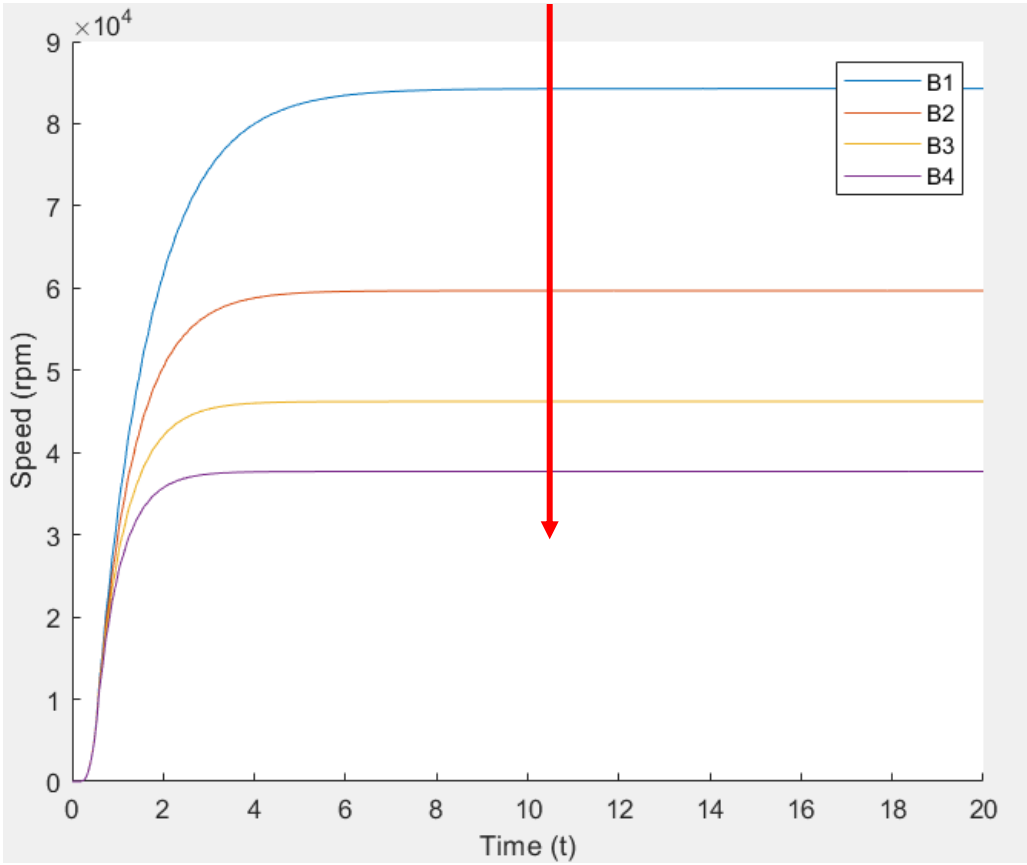
Speed

參數變化對轉速轉矩之影響

$B \uparrow \Rightarrow \omega \downarrow$

Viscous damping (N.m.s/rad)	
B_1	0.002
B_2	0.004
B_3	0.006
B_4	0.008

B increase



Speed

Thanks for your attention !