

常问问题 • 06/2017

S120 控制伺服电机速度控制器的自动优化

S120, Speed controller, Auto Tuning

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目录

1	概述	3
2	自动控制器优化步骤	3

1

2

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概述

在实际伺服控制应用中,负载运行过程中有时会出现电机啸叫或运行不流畅的情况,此时可以考虑对伺服电机的速度控制器进行优化来解决这些问题。

STARTER\SCOUT 软件为用户提供了伺服电机的自动优化功能(Automatic controller setting),通过自动优化功能可以自动识别电流环,正负向负载测量,自动设置速度环参数等。注意此功能仅局限于 S20 的伺服控制方式。

自动控制器优化步骤

通过 STARTER\SCOUT 软件对控制器进行自动优化的步骤如表 2-1 所示。



۷.		1:			
	Measuring function inactive SINAMICS Integra	sume control priority!	<u> </u>		
	Automatic controller setting Measurements Time diagram FFT diagr	am Bode diagram			
	Controller. Speed controller	•			
	Drive: SERVO_04	-			
	Controller setting sequence:	Expert mode Bar	ndwidth:	500 <u>-</u> Hz	
	 1. Measurement of the mechanical system, Part 1 	Par	rameters for the measure	ment of the mechanical system	
	- 2. Measurement of the mechanical system, Part 2	Am	plitude:	0.083 Nm	
	 3. Identification of the current control loop 	Ave	eraging operations:	7	
	 4.Calculation of the speed controller setting 	Offs	set.	10.000 rpm	
	Please perform the following steps to start the calculation of the 1. Select the drive 2. Assume control priority 3. Select the controller for which the automatic setting 4. Switch the drive on 5. Start the calculation using the appropriate toolbar is Described the cancer calculation calculation.	controller parameters: is to be performed con			
	Parameter Parameter to	ext	Current valu Cal	ulated valu	
	p1400[0] Speed control configuration		3a0H		
	p1400[0].3 Reference model speed setpoint, I component p1414[0] Speed setpoint filter activation		Off		
	p1414[0].0 Activate filter 1 p1414[0].1 Activate filter 2		No		
	p1441[0] Actual speed smoothing time		0.194	ms	
	p1462[0] Speed controller P gain adaptation speed, lower p1462[0] Speed controller integral time adaptation speed lo	wer	13.260	ms	
	p1656[0] Activates current setpoint filter p1657[0] Current setpoint filter 1 tune		1H [1] Low pass		
3.	点击" Assume control priorit	ty!"获取控制	刂权:		
	Measuring function inactive	Assume control	priority!	[명]·영명]=]?	
	Automatic controller setting Measurements Time diagram	m FFT diagram Bode dia	aram)		
	Anomalic complete second [measurements] time diagram		and a l		
	Controller. Speed controller	•			
	Drive: SERVO_04				
	Controller setting sequence:	Expert	tmode Ba	ndwidth:	
	→ 1. Measurement of the mechanical system	, Part 1	Pa	rameters for the measurem	nent
	 2. Measurement of the mechanical system 	, Part 2	Am	plitude:	
	 3 Identification of the current control loop. 		A.,,	araging operations:	
			AV	and and approximate.	
	 4.Calculation of the speed controller setting 	9	Offe	set.	
1	点击"Accept"按钮,进行监控	时间的确认.			
т.	Assume Control Priority				
	- ife-sign monitoring				
	Active				
	Monitoring time: 1000				
	Monitoring time. 1000 ms				
	V Infeed				
	Assume control priority				
	SINAMICS Integrated & INF 02				
	leve weed we drawer for				
	The tool fetches the control priority for the infeed!				
	When the control priority is returned via the tool, the	e infeed			
	is switched off. This can interface with a program of a higher law of	control			
	if this uses the same infeed.	control,			
	This function may only be used under observance of the relevant safety notes. Failure to observe these safety notes may result in correspond incurve or material demonst	e			
	This function may only be used under observance of the relevant safety notes. Failure to observe these safety notes may result in personal injury or material damage	e.			
	This function may only be used under observance of the relevant safety notes. Failure to observe these safety notes may result in personal injury or material damage Safety notes	e.			

5.	点击 ■ 按钮〕 出的警告	进行自动优化,『 窗口中点击" Yes	随后点击执行所有 s"按钮:	步骤按钮 追开	始测量,	在弹
	Automatic co	ntroller setting			1	×
		,				
	<u> </u>	lake care when usin	g the measuring function	on!		
	, F	When performing the measur parameterization of the meas	ement, the drive produces a mo uring function (e.g. offset, amplitu	vement in accordance with ude, measuring time).	the	
		Please ensure that no pe plant or machine can res	rsonnel are in the endange ult from these movements (e	red area and that no da e.g. from the mechanica	mage to your I endstops).	
	c	Do you want to continue?				
			Yes	lo		
6.	测量结束后, 点击右下角的	得到优化后的速 」" Accept valu	度环及电流环参数 ies"按钮接受计算	牧与当前值对比, 算结果:	如下图	听示,
6 . 通	测量结束后, 点击右下角的 Result of the speed	得到优化后的速 '" Accept valu controller setting:	度环及电流环参数 les"按钮接受计算	文与当前值对比, 算结果:	如下图	听示,
6 . 通	测量结束后, 点击右下角的 Result of the speed	得到优化后的速 「"Accept valu controller setting:	度环及电流环参数 IeS"按钮接受计算 Parameter text	文与当前值对比, 算结果: Current valu	如下图角	听示, Junit -
6. 通	测量结束后, 点击右下角的 Result of the speed Parameter p1400[0] Sp	得到优化后的速 "Accept valu controller setting: sed control configuration	度环及电流环参数 IeS"按钮接受计算 Parameter text	收与当前值对比, 算结果: ☐ Current valu 3a0H	如下图户 Calculated value 3a0H	听示, 」 Unit 4
6. 通过s	测量结束后, 点击右下角的 Result of the speed Parameter p1400[0] Sp p1400[0] Sp	得到优化后的速 "Accept valu controller setting: eed control configuration ference model speed setpoint, I c	度环及电流环参数 IeS"按钮接受计算 Parameter text	文与当前值对比, 算结果: 	如下图 Calculated value 3a0H Off	听示, 」Unit 4
6. 通过 S	测量结束后, 点击右下角的 Result of the speed Parameter p1400[0] Sp p1400[0] Sp	得到优化后的速 "Accept valu controller setting: eed control configuration ference model speed setpoint, I co eed setpoint filter activation	度环及电流环参数 IeS"按钮接受计算 Parameter text	牧与当前值对比, 算结果:	如下图序 Galculated value 3a0H Off 0H	听示, 』 Unit 4
	测量结束后, 点击右下角的 Result of the speed p1400[0] 3 p p1400[0] 3 p p1414[0] 5 p p1414[0] 0 Act	得到优化后的速 ("Accept value controller setting: eed control configuration ference model speed setpoint, I c eed setpoint filter activation tivate filter 1	度环及电流环参数 IeS"按钮接受计算 Parameter text	文与当前值对比, 算结果: <u>Current valt</u> 3a0H OH No	如下图月 <u>Calculated vale</u> ^{3a0H} Off 0H No	听示, u Unit 4
6. 通过S	测量结束后, 点击右下角的 Result of the speed Pl400[0] 3 Re p1414[0] 5 P p1414[0] 5 P p1414[0] 4 Act	得到优化后的速 4 "Accept valu controller setting: eed control configuration ference model speed setpoint, I c eed setpoint filter activation tivate filter 1 tivate filter 2	度环及电流环参数 IeS"按钮接受计算 Parameter text	文与当前值对比, 算结果: 3a0H Off Off No No No	如下图月 3a0H Off OH No No	听示, u Unit
6. 通过 S T A	测量结束后, 点击右下角的 Result of the speed Parameter p1400[0] Sp p1400[0] Sp p1414[0] Ac p1414[0] Ac	得到优化后的速 "Accept valu controller setting: eed control configuration ference model speed setpoint, I c eed setpoint filter activation tivate filter 1 tivate filter 2 tual speed smoothing time	度环及电流环参数 IeS"按钮接受计算 Parameter text	女与当前值对比, 算结果: 3a0H Off 0H No No No 0 194	如下图月 3a0H Off 0H No No 0.194 0.200	听示, J Unit J
6. 通过S T A	测量结束后, 点击右下角的 Result of the speed Parameter p1400[0] 3 Re p1414[0] 0 Act p1414[0] 1 Act p1441[0] 1 Act p1441[0] 0 Act p1441[0] 5 P	得到优化后的速 "Accept valu controller setting: eed control configuration ference model speed setpoint, I c eed setpoint filter activation tivate filter 1 tivate filter 2 tual speed smoothing time eed controller P gain adaptation of	度环及电流环参数 IeS"按钮接受计算 Parameter text component	文与当前值对比, 算结果: 3a0H Off 0H No No 0.194 0.008 4.000	如下图月 3a0H Off 0H No 0.194 0.032 0.051	f 丁示,
6. 通过S T A	测量结束后, 点击右下角的 Result of the speed Pl400[0] 3 Fe p1400[0] 3 Fe p1414[0] 4 Act p1414[0] Act p1414[0] Act p1414[0] 5 p p1442[0] 5 p p1442[0] 5 p	得到优化后的速 "Accept valu controller setting: eed control configuration ference model speed setpoint, I co eed setpoint filter activation tivate filter 1 tivate filter 2 tual speed smoothing time eed controller P gain adaptation of eed controller P gain adaptation of eed controller P gain adaptation of eed controller of the specific filter	度环及电流环参数 IeS"按钮接受计算 Parameter text component speed, lower ation speed lower	文与当前值对比, 算结果: Current valu 3a0H Off 0H No No 0.194 0.008 13.260	如下图所 3a0H Off OH No 0.194 0.032 6.851	听示, a Unit a ms Nms/rat ms
6. 通过START	测量结束后, 点击右下角的 Result of the speed p1400[0].3 p1414[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].5 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p144[0].3 p145[0	得到优化后的速 4 Accept valu controller setting: eed control configuration ference model speed setpoint, I co eed setpoint filter activation tivate filter 1 tivate filter 2 tual speed smoothing time eed controller P gain adaptation s eed controller regain time adapt tivates current setpoint filter rent satorioit filter 1 time.	I度环及电流环参数 IES"按钮接受计算 Parameter text component speed, lower ation speed lower	文与当前值对比, 算结果: 3a0H Off Off No No 0.194 0.008 13.260 1H U	如下图月 3a0H Off OH No 0.194 0.032 6.851 1H	听示, a Unit a ms Nms/rat
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6. 通过STARTF	测量结束后, 点击右下角的 Result of the speed Parameter p1400[0] Sp p1414[0] Act p1414[0] Act p1414[0] Act p1462[0] Sp p1656[0] Act p1656[0] Cu p1659[0] Cu	得到优化后的速 "Accept valu controller setting: eed control configuration ference model speed setpoint, I c eed setpoint filter activation tivate filter 1 tivate filter 1 tivate filter 2 tual speed smoothing time eed controller integral time adapt tivates current setpoint filter rent setpoint filter 1 type rent setpoint filter 1 type rent setpoint filter 1 type	度环及电流环参数 ICS"按钮接受计算 Parameter text component speed, lower ation speed lower natural frequency damping	女与当前值对比, 算结果: 3a0H Off OH No No 0.194 0.008 13.260 1H [1] Low pass: 1999.000 0.700	女口下图月 3a0H Off 0H No 0.194 0.194 0.32 6.851 1H (1] Low pass: PT 1999 000 0.700	小示, a Unit a ms Nms/rat ms Hz
6. 通过STARTE	测量结束后, 点击右下角的 Result of the speed Parameter p1400[0] 3 Re p1414[0] 1 Aci p1441[0] Aci p1441[0] 1 Aci p1442[0] Sp p1442[0] Sp p142[0] Sp p1656[0] Aci p1656[0] Cu p1656[0] Cu	得到优化后的速 "Accept valu controller setting: eed control configuration ference model speed setpoint, I c eed setpoint filter activation tivate filter 1 twate filter 2 tual speed smoothing time eed controller P gain adaptation i eed controller P gain adaptation i twates current setpoint filter rrent setpoint filter 1 uppe rrent setpoint filter 1 denominator rrent setpoint filter 1 denominator rrent setpoint filter 1 denominator	度环及电流环参数 IeS" 按钮接受计算 Parameter text component speed, lower ation speed lower natural frequency damping atural frequency	女与当前值对比, 算结果: 3a0H Off 0H No 0.194 0.008 13.260 1H [1] Low pass: 1999.000 0.700 1999.000	女口下图月 3a0H Off 0H No 0.194 0.032 6.851 1H [1] Low pass: PT 1999 000 0.700 1999 000	f 示, a Unit a ms Nms/rat ms Hz Hz
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表 2-1 速度控制器自动优化步骤