Re: PID question

Source: http://sci.tech−archive.net/Archive/sci.electronics.design/2006−11/msg04860.html

- *From*: Costas Vlachos <c−X−vlachos@xxxxxxxxxxxxx>
- *Date*: Thu, 23 Nov 2006 17:56:09 +0200

hondgm@xxxxxxxxx wrote:

> Costas Vlachos wrote:
>
> > John Popelish wrote:
> >
> > > The one that reads current cannot be involved in the analog
> > > current regulation, without slowing it down, though it is
> > > fine to use it for monitoring the average current for other
> > > purposes. You will have to use the analog signal it
> > > digitizes as the feedback for the analog PID current
> > > regulator.
> >
> > John, I think there is a misunderstanding here. The OP *doesn't have*
> > and analogue PID current regulator! He wants to do it in s/w with the
> > PIC. The only analogue regulator in his setup is for the voltage. He has
> > *one* DAC to provide the voltage set point to the analogue voltage
> > regulator, and reads the current through an ADC. He wants to use that
> > ADC's reading to limit the current digitally by modifying the voltage
> > set point of the analogue voltage regulator using a PID algorithm in
> > s/w. I hope this is now clearer.
> >
> > ––
> > Regards,
> > Costas
>
> Yes, thank you! I wasn't sure if I was describing this clearly. This
> is exactly what I'm doing. No analog current limiter here. On your
> next post where you say that "you must allocate several samples to your
> desired response time", do you mean that I should be taking an average
> of several samples before feeding it into the PID loop? I am doing
> this, and yes it probably would be very unstable otherwise. I will
> post results when I get something more finalized, which could take
> awhile.

What I meant was that you should tune your PID so that the speed of response of the current limiter is such that there are several samples spread along the transition curve (say, at least 10). Otherwise your system may exhibit oscillations around the set point in the transient period (under−damped) and may be dangerously close

to instability. Given that a bench PSU is supposed to drive a variety of loads, I would prefer to tune for a conservative (over−damped) response at the expense of speed.

The averaging that you're doing to obtain each sample is a low−pass filter that removes glitches and noise. It's a good thing. But I was talking about the samples that the PID sees (after the averaging). So, if each sample is the average of, say, 5 A/D readings, this would result in a loop sample time of 50us. This is the sample time I was talking about. So, 10 samples in the transient period of the closed−loop response would result in a response time of around 500us.

To tune your PID, start with P only (adjust it to a conservative value) and then slowly increase I until you get a suitable response (remember, slow is usually better in terms of stability). Then play with P and I to fine−tune. You may not need the D term as it amplifies the noise present in the error term.

−−
Regards,
Costas

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SPAM−TRAPPED: Please remove "−X−" before replying
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