

Any algorithms to solve an integrodifferential equation?

Source: <http://sci.tech-archive.net/Archive/sci.math.num-analysis/2006-10/msg00425.html>

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 - *Date:* Sat, 28 Oct 2006 03:51:59 +0800
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The following description was posted before I know the equation I encountered is an integrodifferential equation, So now the problem is, is there any effective codes or algorithms solving IDEs?Thanks

PS: I often use fortran

Hi all, I will try to make myself understood as clearly as possible, though the problem is a little complicated, and, my English is not very well.

the IDE has a form like this:

$$d P(t,k)/ d t = \text{RHS}(P,t,k)$$

what is weird here is that $\text{RHS}(P,t,k)$ is a function of the concrete form of function $P(t,x)$ at certain step t , not merely the value of it.

$$\inf / \text{RHS}(P,t,k) = \int_0^{P(t,k*y)} F(y) dy / 0$$

given the initial conditions: $P(t=0,x)=P_1(x)$, $\text{RHS}(P=P_1,t=0,k)=\text{RHS}_1(k)$

when $t=t_n$,

$$P_n(t_n,x) = P_m(t_m,x) + (\text{STEP SIZE of } t) * \text{RHS}(P_m,t_m,x)$$

where $m=n-1$, the formula above gives the recursive procedure I should follow in the program.

please take notice of the confusability of k and x , in the output of the program, I want to get a series of $P(t=t_{\text{end}},k)$, $k = k_1, k_2, k_3 \dots k_p \dots k_60$, i.e. a series of points on the output curve of function $P(t=t_{\text{end}}, x)$. That is to say, I have to an integrate different ODE for each k_p .

so far, the problem is that, how to transfer the parameters effectively, without causing confusion in the recursive procedure. For example, there

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is an integration for RHS,

RHS(P_n, t_n, k) calls $P(t_n, x)$, but the subroutine doing integration only accept single value func as its parameter, so I should transform $P(t_n, x)$ to $P(x) |_{t=t_n}$, where COMMON block would be used. How to make a common block available and correct in a recursive procedure, given that the block would change its value in different period of recursion?

I have thought of a method to crack the integration subroutine to accept t_n as a parameter, but that would destroy its stability, which I don't prefer to.

any suggestions or comments on the algorithm? I will greatly appreciate them since I haven't start my code yet....:) thanks

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Don't forget your dreamS

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