Subject: Re: Solving system of ODEs backwards in time?
Posted by BLesht on Fri, 04 Aug 2017 20:01:10 GMT
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Hi Craig,

I'm sorry to seem dense, but I don't see how that applies. Perhaps I haven't explained my problem sufficiently, or perhaps I really don't understand the nuances, or maybe I've been misapplying LSODE (or all the above).

I have a system of 19 coupled ODEs. Let C be the 19 element vector representing the state of the system at time point i. The vector of derivatives is dC(i)/dt = (W(i) + A(i) dot C(i)) / V in which W is a 19-element vector that changes at every point i, A is a 19x19 "transfer" matrix expressing the couplings among the state variables (many zeros) but which also changes at every point i, and V is a 19-element constant vector. Given an initial condition C0, I have been been using LSODE is advance the solution from time i to time i+1 (calculating C(i+1) using a time step of i/4. I repeated those steps for the desired number of i steps.

This seems to work (at least provides answers that agree well with observations) going forward. What I want to do now is start with a known state at time i, and sets of known W vectors and A matrices for times i-1, i-2, ... i-n and find what C(i-n) would have had to be to result in the observed C(i) given that set of W vectors and A matrices.

What confused me when I was trying to set this up myself was that the state at time i, depends on both the state at time i-1 and the derivatives based on the state at time i-1. That is, the derivative at time i-1 can't be computed without knowing the state at time i-1 because of the A dot C term.

Thanks, Barry