Estimates of blow-up time for solutions to nonlinear parabolic problems

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The question of blow-up of solutions to nonlinear parabolic equations and systems has received considerable attention in the recent literature. In practical situations one would like to know among other things whether the solution blows up and, if so, at which time blow-up occurs. When the solution does blow up at some finite time T, this time can seldom be determined explicitly, so much effort has been devoted to the calculation of bounds for T. Most of the methods used until recently have yielded only upper bounds for T, so that in particular problems in which blow-up has to be avoided, they are of little value. We investigate the question of blow-up for nonnegative classical solutions of some nonlinear parabolic problems defined in a bounded domain. Under conditions on data and geometry of the spatial domain, explicit upper and lower bounds for the blow-up time are derived.