Note that in the limit where $c$=1, $x(\tau)$=$x(0)$ (no change), and in the limit $c$=0 (the photon flux turned off), we have: $x(\tau \rightarrow \infty) = 1$, *i.e.* all ions settle down to the lower state, $X^{+n}$.

Examples of response curves for four values of $c$ are shown in figure 3–7. Note that for a factor of two increase in flux ($c$=2), the ions reach equilibrium faster than for a factor of two decrease in flux ($c$=0.5).

3.6.3 : Application to Specific Cases of BAL Time Variability

To test the form of the time-dependent response we need evidence of BAL time variability between more than two epochs. With only two epochs, we would only be able to put limits on the response. The exponential form of this solution means that we expect a fairly rapid decrease in the abundance immediately after the flux change, and then lessening changes as the ions approach their equilibrium values. One of the few (perhaps only) cases of multiple epoch BAL time variability was for CSO 203 (0842+3431, see Barlow *et al.* 1992). We observed three distinct levels of absorption in C IV $\lambda$1549, but did not have sufficient data on the Lyman-$\alpha$ BAL. As mentioned in that paper, the flux of this object was approximately constant during the period when the BALs were changing. Assuming that the observed flux at ~2000Å tracks with the $C^{+3}$ ionizing flux at ~50 eV (250Å), we postulated a change in flux prior to the monitoring. The conclusion was that the BALR column density change seen between the intermediate and final epoch was too large to be fit by the above solution, regardless of the electron density chosen, and that time-dependent recombination delays could not be significant. However, the ionizing flux may not track with the observed flux, in which case it is difficult to determine the effect of recombination delays since we do not know the character of the far UV variations.

In another case with only two distinct levels of absorption strength (0846+1540, see Barlow *et al.* 1992b), we are able to limit the response of the C IV BALs to $\lesssim$120 days (in the QSO rest frame). This implies that the $n_e \gtrsim 10^4$ and $r \lesssim 1$ kpc (see §2.5) for the BALR of this object.