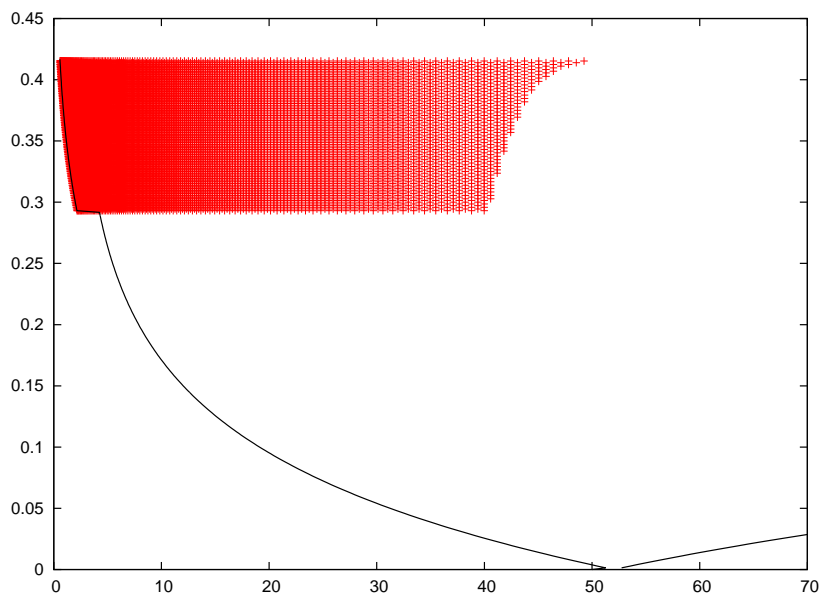# Discrete Dividend II:  Jump in the Value Function

payment $D$ at time $t_D$. The parameters of an American-style put are chosen $S_0 = 52$, $K = 50$, $r = 0.1$, $\sigma = 0.4$, $T = 5/12$, $D = 2.06$, $t_D = 0.29166666667$ (taken from [Hull (2000)]); calculation using a binomial tree with $M$ time steps.
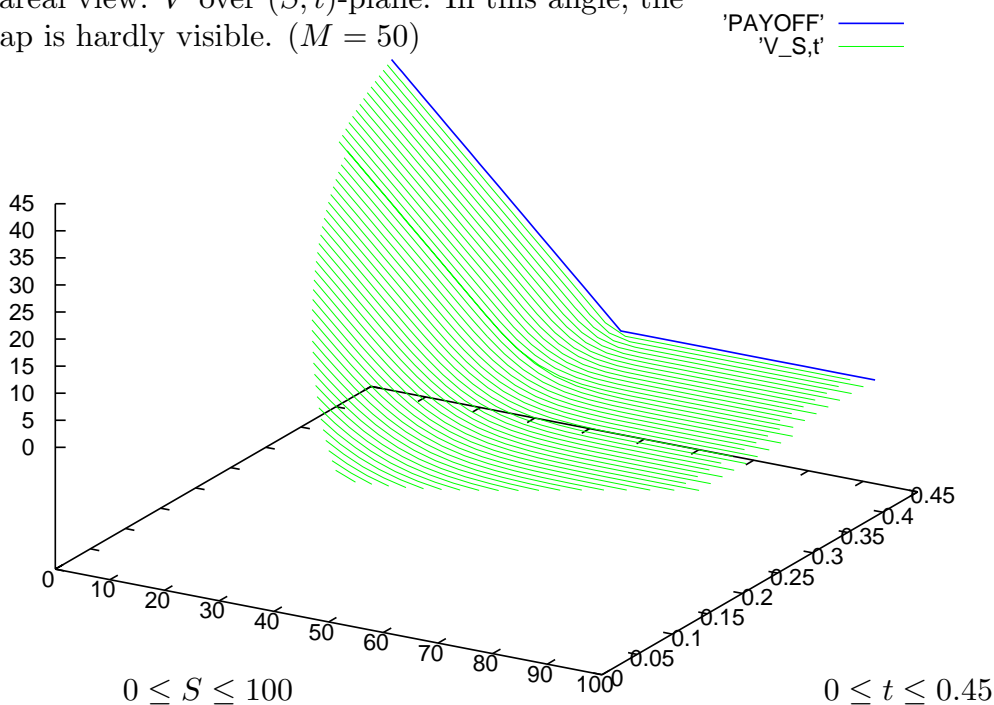
Below we visualize the jump in the surface $V(S,t)$ at the ex-dividend date $t_D$, decribed by
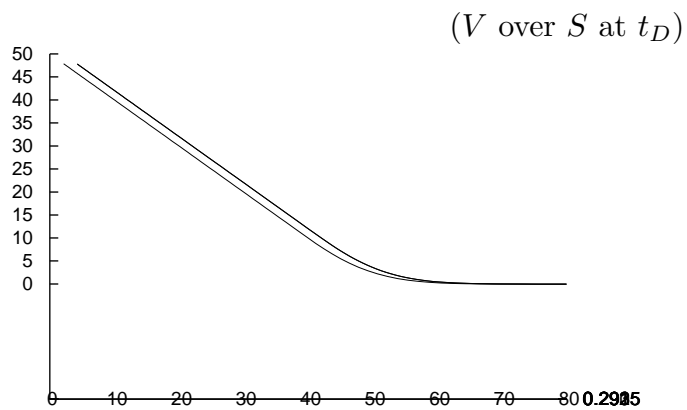
$$V(S, t_D^-) = V(S - D, t_D^+).$$

For preparation we show the $(S,t)$-plane with exponential boundaries of the tree (black lines) and stopping area (red; $M = 300$):
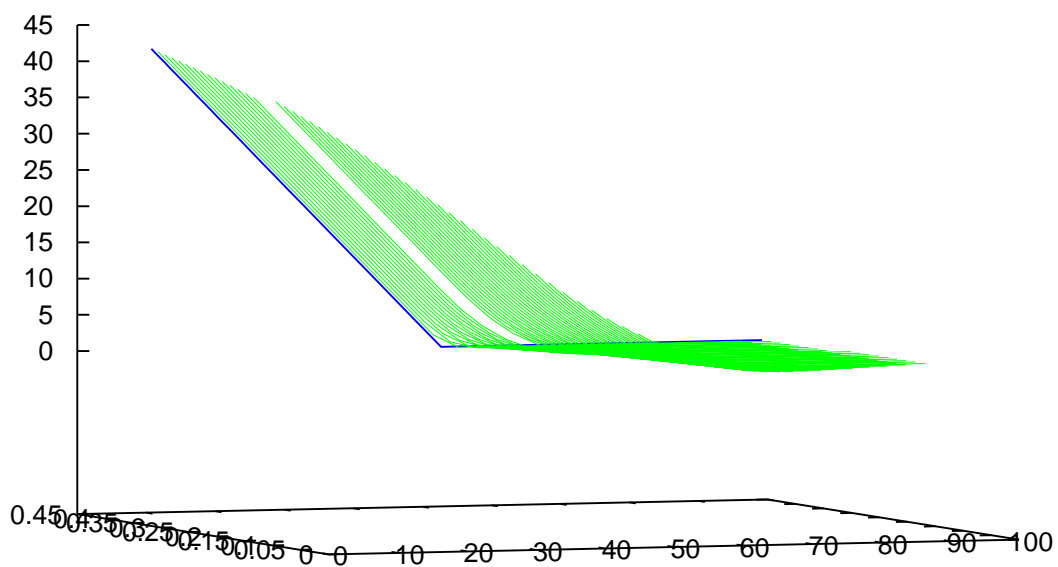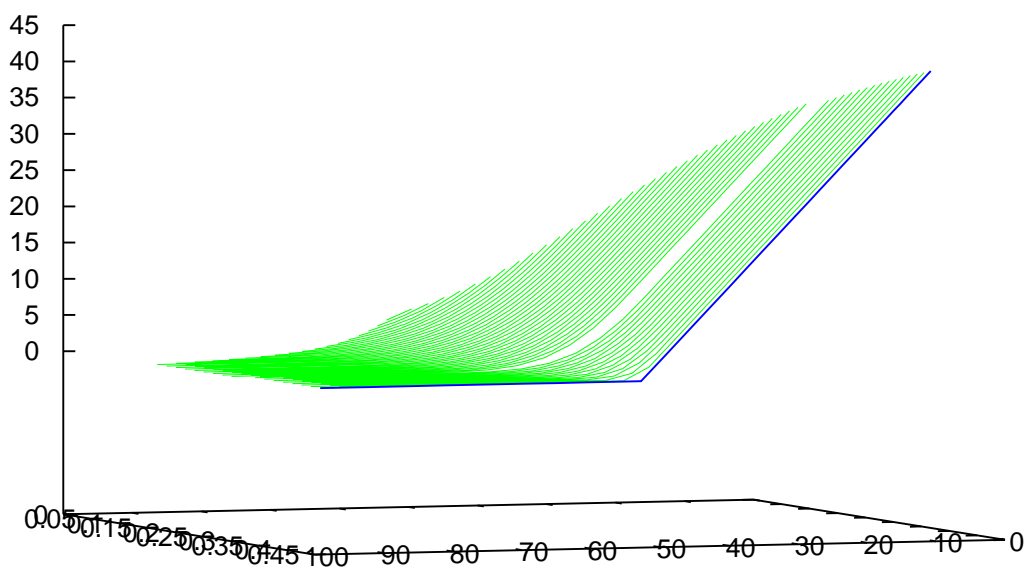


below: areal view: $V$ over $(S,t)$-plane. In this angle, the jump/gap is hardly visible. ($M = 50$)

'PAYOFF' ——
'V_S,t' ——



$0 \leq S \leq 100$                    $0 \leq t \leq 0.45$

the gap:                                           ($V$ over $S$ at $t_D$)



below: areal views, with vertical axis not in $(0,0)$     (green: $V(S,t)$; blue: payoff)





(To visualize, imagine the vertical axis in the $(S,t) = (0,0)$ point.)