5 Conclusion

Finally, in this section we discuss properties on blow-up rates and constants and conclude some results from all preceding discussions.

5.1 Tables of Results

Suppose that u is a classical positive solution of (2.1) and if $c_2 > 0$, $u_0 \geq 0$, $u_1 > 0$ and $u_0^p \geq -\dfrac{c_1}{c_2}$. We have the following tables:

Blow-up Phenomena for $1 \leq q < 2$

	Behavior	Blow-up time
u	Blow-up	$(2-q)^{\frac{1}{q-2}} \int_{u_0}^{\infty} (c_1 r + \frac{c_2}{p+1} r^{p+1} + E(0))^{\frac{1}{q-2}}\, dr$
u'	Blow-up	The same as u
u''	Blow-up	The same as u

	Blow-up rate	Blow-up constant
u	$\frac{2-q}{p+q-1}$	$(\frac{p+q-1}{2-q})^{-\frac{2-q}{p+q-1}} [(2-q)\frac{c_2}{p+1}]^{\frac{-1}{p+q-1}}$
u'	$\frac{p+1}{p+q-1}$	$[\frac{c_2(p+q-1)}{p+1}(\frac{c_2(2-q)}{p+1})^{\frac{-p}{p+1}}]^{\frac{-(p+1)}{p+q-1}}$
u''	$\frac{q(p+1)}{p+q-1} + \frac{p(2-q)}{p+q-1}$	$c_2\{[\frac{c_2(p+q-1)}{p+1}(\frac{c_2(2-q)}{p+1})^{\frac{-p}{p+1}}]^{\frac{-(p+1)}{p+q-1}}\}^q \{(\frac{p+q-1}{2-q})^{-\frac{2-q}{p+q-1}} [(2-q)\frac{c_2}{p+1}]^{\frac{-1}{p+q-1}}\}^p$

Blow-up Phenomena for $q = 2$

	Behavior	Blow-up time
u	Blow-up	$\int_{u_0}^{\infty} \frac{1}{\exp(c_1 r + \frac{c_2}{p+1} r^{p+1} + E_1(0))}\, dr$
u'	Blow-up	The same as u
u''	Blow-up	The same as u

u	$\lim_{t \to T_{12}^-} [\frac{1}{-\ln(T_{12}-t)}]^{\frac{1}{p+1}} u(t) = [\frac{c_2}{p+1}]^{-\frac{1}{p+1}}$
u'	$\lim_{t \to T_2^-} [-\ln(T_2-t)]^{\frac{p}{p+1}} (T_2-t) u'(t) = c_2^{\frac{-1}{p+1}} (\frac{1}{p+1})^{\frac{p}{p+1}}$
u''	$\lim_{t \to T_3^-} \{[-\ln(T_3-t)]^{\frac{p}{p+1}} (T_3-t)\}^q \{[-\ln(T_3-t)]^{\frac{-1}{p+1}}\}^p u''(t)$ $= c_2 [c_2^{\frac{-1}{p+1}} (\frac{1}{p+1})^{\frac{p}{p+1}}]^q [(\frac{c_2}{p+1})^{\frac{-1}{p+1}}]^p$

Blow-up Phenomena for $q > 2$

	Behavior	Blow-up rate	Blow-up constant
u	Bounded	None	None
u'	Blow-up	$\frac{1}{q-1}$	$[(q-1)(c_1 + c_2 u(T_2)^p)]^{\frac{1}{1-q}}$
u''	Blow-up	$\frac{q}{q-1}$	$(c_1 + c_2 u(T_3)^p)\{[(q-1)(c_1 + c_2 u(T_3)^p)]^{\frac{1}{1-q}}\}^q$

5.2 Properties of Blow-up Rates and Blow-up Constants of u

Property 5.1 *Suppose that $1 \leq q < 2$, the blow-up rate α is strictly decreasing and convex in p(Figure 1); α is strictly decreasing and convex in q(Figure 1). If $[\frac{p+q-1}{2-q}]^{2-q} > \frac{e(p+1)}{c_2(2-q)}$, the blow-up constant β is strictly increasing in p(Figure 2); otherwise β is decreasing in p.(Figure 2).*

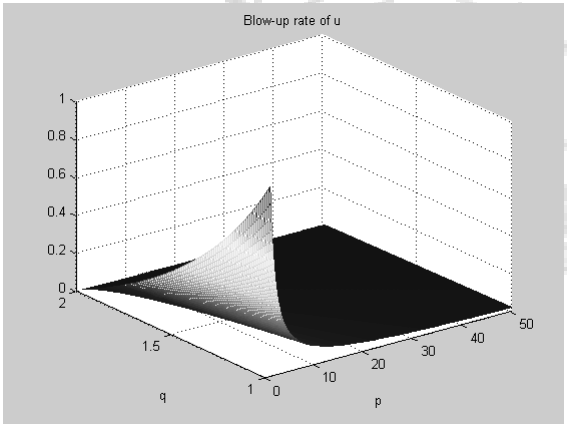

Figure 1: $1 \leq q < 2$.

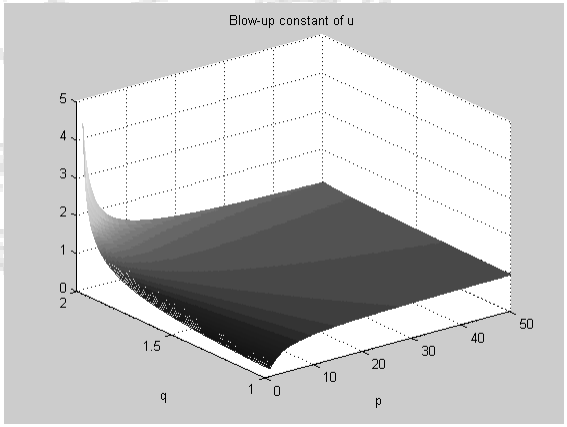

Figure 2: $1 \leq q < 2,\ c_2 = 10$.