We can see from Fig. 2that when $t \to T$,the geodesic and the real is unlikely seriously.It just because the self bug of the Tikhonov regularization method.

In fact,the consided problem (1) is converted to the problem described by (4) .The inverse problem is to get $\omega(t)$ through $v(d,t)$ by the first Volteral equation

$$K\omega(t) = \int_0^t \frac{\alpha e^{-\frac{(d-X(t))^2}{4\alpha(t-\xi)}}}{2\sqrt{\pi\alpha(t-\xi)}}\omega(\xi)d\xi = \int_0^t G'(t,\xi)\omega(\xi)d\xi = f^*(t) \tag{12}$$

From the equation above,easy to know that ,to confirm $\omega(t)$ on $[0,t)$ only need $f^*(t)$ on $[0,t)$,which just reflect the causality of the problem.that is,the knowledge of $f^*(t)$ on the past $[0,t)$ already reflects the value of $\omega(t)$ on $[t,T]$,and have nothing to do with the knowledge of $f^*(t)$ on $[t,T]$

However.,when used the Tiknonov regularization method on equation (12) to get $\omega(t)$,it is converted to the equation shown as (13).

$$\int_\xi^T G'(t,\xi)\int_0^t G'(t,\tilde{\xi})\omega(\tilde{\xi})d\tilde{\xi}dt + \alpha\omega(t) = \int_{\xi_i}^T G'(t,\xi_i) f^\delta(t)dt \tag{13}$$

It is a posed second Fredholm equation,which is valid to get $\omega_\partial(t)$,the steady approximate solution of $\omega(t)$.

But,notice that the causality reflected by equation(12) is changed.seeing form (13),it converts to get $\omega(t)$ on $[0,t)$ by $f^*(t)$ on $[t,T]$,that is,when to get $\omega(t)$,the future value is used to get now value,which is out of reason.It is obvious that when $t \to T$,consider both sides of equation(13),the right is tended to zero,and the first part of the left is tended to zero.Then $\alpha\omega(t) \to 0$,that is $\omega(t) \to 0$ .That is the reason of expressly glide when $t \to T$ on Figure2.

It is the self-bug of Tikhonov regularization method on special case.The Landweber method or the ductibility continuously method can be used to treate the case.Here we will use method of ductibility continuously to avoid the complexion.The result is shown in Figure3.

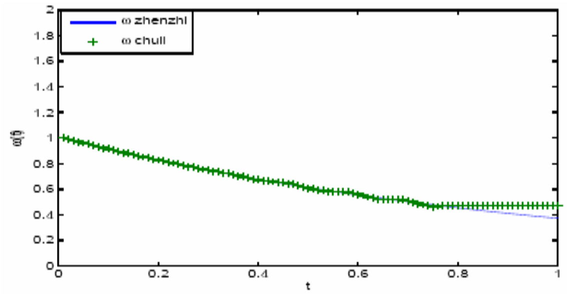

Figure 3. figure of $\omega(t)$ treated

Then using the (10),we can get $q(t)$ .It's figure is as following Figure4

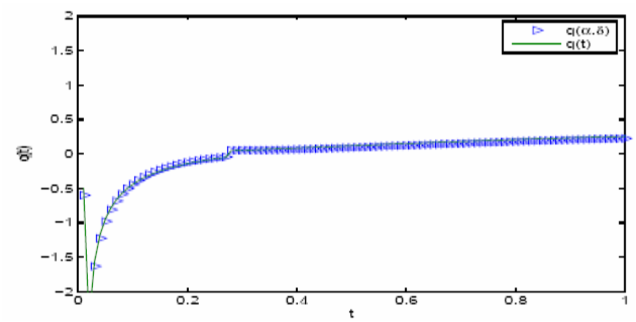

Figure 4. figure of $q(t)$

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