In the one dimensional case, the solution to Eq. (5) with time dependent diffusivity is well known

$$C(x,t) = \frac{1}{2}\sum_{n=0}^{\infty}(-1)^n\left[\mathrm{erf}\left(\frac{x-(n+1)L}{\sqrt{4\Theta(t)}}\right) - \mathrm{erf}\left(\frac{x-nL}{\sqrt{4\Theta(t)}}\right)\right] + \frac{1}{2}\sum_{n=0}^{\infty}(-1)^n\left[\mathrm{erf}\left(\frac{x+(n+1)L}{\sqrt{4\Theta(t)}}\right) - \mathrm{erf}\left(\frac{x+nL}{\sqrt{4\Theta(t)}}\right)\right]. \tag{S1}$$

Eq. (6) can be further simplified by applying Gauss's theorem:

$$DSC(t) = \Delta H\int_0^L \frac{\partial}{\partial t}C(z,t)dz = 2\mathrm{D}(\mathrm{t})\Delta\mathrm{H}\left.\frac{\partial C(x,t)}{\partial x}\right|_{x=0} \tag{S2}$$

Combining the above two equations yields Eq. (7). To obtain Eq. (9), an approximation must be made as shown in the following equation

$$\Theta(t) \approx \frac{RT^2}{\beta E_a}D(t). \tag{S3}$$

which comes from the asymptotic expansion. This approximation results in less than a 1% error in the temperature range of 0°C <T<1300°C and the activation range of 30kJ/mol< E_a <300kJ/mol. Substituting this approximation into Eq. (7) gives

$$DSC(t) = \left(1 - 2e^{-\frac{1}{4\Theta_t}} + e^{-\frac{1}{\Theta_t}} + \cdots\right)\frac{\sqrt{\Theta_t}E_a}{RT} \qquad \Theta_t \equiv \frac{E_aK_0}{R\beta L^2}\left(\frac{RT}{E_a}\right)^2 e^{-\frac{Ea}{RT}}. \tag{S4}$$

To locate the DSC curve peak position, ξ_t is treated as an independent variable, and a value for ξ_p is found that makes $DSC'(\xi_p)$ zero, and then T_p is found from ξ_p.

$$DSC'(\Theta_t) = \frac{\partial}{\partial t}\left[\left(1 - 2e^{-\frac{1}{4\Theta_t}} + e^{-\frac{1}{\Theta_t}} + \cdots\right)\frac{\sqrt{\Theta_t}E_a}{RT}\right] \approx \frac{\partial}{\partial t}\left[\left(1 - 2e^{-\frac{1}{4\Theta_t}} + e^{-\frac{1}{\Theta_t}} + \cdots\right)\sqrt{\Theta_t}\right]\cdot\frac{E_a}{RT} \tag{S5}$$

An approximate is made because E_a/RT always changes slowly compared to Θ_t and therefore it can be viewed as a constant in the derivatives. The root of the above equation is independent of any system parameters can be found numerically as:

$$\Theta_p \approx 0.0023 \tag{S6}$$