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## Non-equilibrium fast thermal response of polymers.

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### Graphical abstract:

Non-equilibrium thermal response of polymers is described by the linear differential equation with dynamic heat capacity  $c_{dyn}(t)$ , which depends on the spectrum of the relaxation time  $\tau_0$ . Thermal response for few definite relaxation time constants  $\tau_0$  is presented in the graph. Next, the response  $T(t, r, \tau_0)$  can be averaged over the relaxation time distribution function, which in turn can depend on temperature.

$$\frac{\partial}{\partial t} \int_0^{\infty} \rho c_{dyn}(\tau) \frac{\partial}{\partial t} T(t - \tau, \mathbf{r}) d\tau = \lambda \Delta T(t, \mathbf{r}) + \Phi(t, \mathbf{r})$$

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