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Authors: Alexander A. Minakov, Christoph Schick

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Non-equilibrium fast thermal response of polymers.

Alexander A. Minakov [a] and Christoph Schick [b,c]

[a] A.M. Prokhorov General Physics Institute, Vavilov st. 38, 119991 Moscow, Russia;

[b] University of Rostock, Institute of Physics and Competence Centre CALOR, Albert-Einstein-Str. 23-24, 18051 Rostock, Germany.

[c] Kazan Federal University, 18 Kremlyovskaya Street, Kazan 420008, Russian Federation

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 τ_0. Thermal response for few definite relaxation time constants τ_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.

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