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Section:

16. Applications

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Approximation results for phase–field systems
In this talk, the following phase field system of Penrose–Fife type is considered

$$
\begin{aligned}
(c_0\theta_t + \lambda(\chi))_t + \kappa\,\Delta\left(\frac{1}{\theta}\right) &= g, \\
\delta\chi_t - \varepsilon\Delta\chi + \beta(\chi) + \sigma'(\chi) &\ni -\frac{\lambda'(\chi)}{\theta},
\end{aligned}
$$

which models the evolution of the the absolute temperature θ and the order parameter χ during a phase transition.
Here, β is a maximal monotone graph and λ and σ are quadratic functions. For the approximate solution of this problem, a time–discrete scheme is used. Convergence and an error estimate that is linear with respect to the time step size will be shown.
Finally, numerical results will be presented.