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Numerical optimization methods for critical currents in superconductors[1] GREGORY KIMMEL, IVAN SADOVSKYY, ALEX KOSHELEV, ANDREAS GLATZ, Argonne National Laboratory — In this work, I present optimization methods for maximizing the critical current in high-temperature superconductors for energy applications. The critical current in the presence of an external magnetic field is mostly defined by the pinning landscape (pinscape) within the superconductor, which prevents magnetic vortices from moving and, therefore, increases its critical current. Our approach is to generate different pinscapes and obtain the resulting critical current by large-scale time-dependent Ginzburg-Landau equations [J. Comp. Phys. **294**, 639 (2015)]. Pinning centers could be any combination of defects, including spherical and columnar defects. The parameters controlling the pinscape are adaptively adjusted in order to find the optimal parameter set, which maximizes the critical current. Here, we compare different optimization methods and discuss their performance.

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