

**How Superconductors Became Practical:
A Walk Through the History and Science of Flux Pinning.**

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Abstract - Since the investigation of flux pinning in superconductors in the early sixties, a considerable amount of work has been accumulated in this field to understand the underlying principles of fundamental interaction mechanisms of flux lines with pinning defects as well as the summation problem for a well characterized arrangement of flux lines. Pinning is and remains one of the essential problems to tailor and optimize the current carrying capability of practical low- T_c or MgB₂ superconductors and to make them viable for application. For high temperature superconductors it is even more challenging because now one has to deal with highly anisotropic superconductors with complex flux and flux line structures which strongly govern the essential irreversibility fields and with a pinning landscape which can be tailored to a large extent to improve engineering critical currents. The challenge is to understand the mechanisms which govern current limitation and to further increase flux pinning and critical current densities in the presently known HTS materials at the operating fields and temperatures, e.g., for devices in electrical and power engineering, to pave the way for a widespread application.

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