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A portable superconducting magnet system with trapped field > 3 T

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A portable magnet system based on bulk (RE)BCO, high temperature bulk superconductors, which constitute high-field magnets, has been designed constructed. The use of a small-volume sterling cryocooler with a base temperature of 50 K has enabled a portable and compact magnet design. The magnetization of the bulk superconductors was realized by a pulsed field magnetization (PFM) technique. The PFM process was considered difficult previously because of the high external field required to fully magnetise high quality bulk samples, according to limitations of the Bean model and to the generation of heat during the magnetisation process. A flux jump phenomenon observed during the rise of the pulsed field, however, was used to drive magnetic flux into the superconductor during the magnetisation process. A peak trapped field of 3.2 T has been achieved at the surface of the bulk superconductor by applying a pulsed field of only 4.86 T as part of this research.

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