

Development of Continuous Superconducting-Magnet Filtration System

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Abstract

To improve water quality, a superconducting-magnet filtration system for removing phytoplankton has been developed. A prototype batch-type system with a small superconducting magnet with a center magnetic field of 1.0 T cooled by a helium refrigerator, removed more than 92% of three kinds of red-tide phytoplanktons at a flow velocity of approximately 360 m/hour.

An imposed system using a continuous superconducting-magnet filtration system consisting of a split magnet with a helium cooler, a reciprocating main magnetic filter, and a rotating sub magnetic filter removed phytoplankton from lake water by attracting coagulated magnetic flocks to magnetic filaments. The filters can be continuously cleaned and regenerated under low magnetic fields while flocks are being separated under high magnetic fields. This system removed more than 93% of the phytoplankton from the lake water at a flow rate of 400 m³/day.