

Prospect of High-Field MRI

Hitoshi Wada, Masaki Sekino *Member IEEE*, Hiroyuki Ohsaki *Member IEEE*,
Tatsuhiko Hisatsune, Hiroo Ikehira, and Tsukasa Kiyoshi

Abstract - High-Field MRI provides high resolutions, well- defined chemical shift spectra and large data acquisition rates, and may bring about a paradigm shift in medicine through the *in-vivo* observation of metabolism. An 11.7 T whole body MRI magnet, for example, should be able to observe metabolic reactions occurring in a human body in addition to producing very precise images of body structures. At this field ¹³C-NMR and biochemical reactions of organic molecules can be detected and analyzed in-situ. Then, organs, tissues, vessels and biochemical processes responsible for irregularities in question will be identified. However, an 11.7 T MRI magnet with a bore diameter of 900 mm is a big challenge to the present magnet technology. Field strengths, magnet sizes and superconducting materials to be needed for future high-field MRI are described.

Index Terms—magnetic resonance imaging, magnetic resonance spectroscopy, NbTi, Nb₃Sn, superconducting magnet.

IEEE/ IEEE/CSC & ESAS EUROPEAN SUPERCONDUCTIVITY NEWS FORUM, No. 12, April 2010.
Reference No. CR17; Category 6,5. This manuscript was submitted for possible publication in the
MT-21 Issue of *IEEE Transactions of Applied Superconductivity* (2010).