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Abstract

TRANSCRANIAL MAGNETIC STIMULATOR EQUIPPED WITH AN ECCENTRIC FIGURE-EIGHT COIL

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Development of compact magnetic stimulators will enable the treatment of intractable neurological diseases at home. We proposed an eccentric figure-eight coil which induces sufficient currents in the brain at lower driving currents of stimulator. Three-dimensional numerical simulations based on the finite element method showed that the eccentric figure-eight coil induced higher eddy currents in the brain in comparison with an ordinary coil. A prototype stimulator coil was fabricated based on the proposed design for use in combination with an originally developed driving circuit. The coil generated a peak magnetic field of 1.4 T. The coil was used to deliver transcranial magnetic stimulation to healthy subjects. The current slew rate corresponding to motor threshold values for the ordinary and eccentric coils were 86 A/ μ s and 78 A/ μ s, respectively.

Brief CV

- March 2000 Bachelor of Engineering, Department of Engineering Synthesis, Faculty of Engineering, The University of Tokyo
- March 2005 Ph.D. in Engineering, Department of Electronic Engineering, Graduate School of Engineering, The University of Tokyo
- April 2005 Assistant Professor, Department of Biomedical Engineering, Graduate School of Medicine, The University of Tokyo
- April 2006 Assistant Professor, Department of Advanced Energy, Graduate School of Frontier Sciences, The University of Tokyo
- June 2008 Visiting Researcher, NeuroSpin, Atomic Energy Commission Saclay Center, France

July 2010 Lecturer, Department of Electrical Engineering
and Information Systems, Graduate School of Engineering,
The University of Tokyo

April 2011 Associate Professor, Department of Electrical Engineering
and Information Systems, Graduate School of Engineering,
The University of Tokyo

Awards

- International Conference on Complex Medical Engineering, Best Conference Paper Award (2012)
- 26th Annual Meeting of the Bioelectromagnetics Society, The Curtis Carl Johnson Memorial Award (2004)
- XXVIIth General Assembly of the International Union of Radio Science, Young Scientist Award (2002)
- 23rd Annual Meeting of the Bioelectromagnetics Society, EMF Therapeutics Award for the Best Student Presentation on Therapeutic Applications of Electromagnetic Fields (2001)

Research fields

Biomedical engineering, magnetic resonance imaging, transcranial magnetic stimulation