

Magnetic Stimulation System

Magnetic Stimulation System with Random Pulse Generation

Reference Number

B69200

Background

Non-invasive magnetic stimulation is an emerging technology to stimulate nerve fibres and muscles, mainly used in rehabilitation to treat people with disabilities or paralysis due to e.g. strokes. The mainstream method to treat these kinds of injuries is electrical stimulation. Electrical stimulation, however, applies a current directly through the skin of the patient, i.e. the stimulation cannot be done painlessly. Magnetic stimulation, on the other hand, is being done without direct contact to the skin and completely painlessly.

To cause a stimulus, however, the magnetic stimulation needs a very strong time varying magnetic field. Providing such a field requires very high currents and leads to a large power dissipation, i.e. heating up of the equipment. As the maximum temperature for medical equipment is legally limited to 40°C, very elaborate cooling mechanism are employed that nevertheless only lead to a usage time of a few minutes. This technological limitation is the main reason why magnetic stimulation did not yet replace electrical stimulation in neurological rehabilitation.

Furthermore, the available stimulation systems only create sine-wave stimulations which are not always the optimal pulse-form to stimulate certain nerve cells.

Invention

The invention describes a circuitry to generate different kinds of pulse forms like:

- The known cosine pulse forms
- Non-cosine pulse forms
- Non-periodic pulse forms
- Repetitive monophasic stimulation with energy recuperation
- Chance for the user to programme a pulse shape online

The possibility to generate any kind of pulse form, an old but overwhelming desire of the scientific community, would have advantages like:

- The stimulation pulse can be optimised for a certain group of neurons so that

Origin

Technische Universität München

Industrial Sector

Medical technology & devices

Keywords

Magnetic stimulation, reduced power consumption, rehabilitation, neurology

Patent Situation

PCT

Offer

Cooperation, license, option, purchase, world-wide, exclusive

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stimulation occurs more specifically while other neuronal cells in the neighbourhood remain practically unaffected. Also the stimulation of different parts of the neurons requires different time constants.

- Pulses can be optimised to any goal, like reduced power consumption or less clicking noise e.g. to use magnetic stimulation in sleep research.

Commercial Opportunities

The invention enables the construction of magnetic stimulation systems that are no longer constrained to sine-wave pulse forms. The whole circuitry can be produced at much lower costs compared to existing technologies. With an optimised pulse form the uptimes of the system can be prolonged, resulting in a more effective treatment of the patient. This invention offers the possibility to replace the electrical stimulation by the painless magnetic stimulation.

Developmental Status

The effectiveness of the invention has been shown in simulations.

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