Contribution ID: **757** Type: **Poster Presentation of 1h45m**

A Novel Design of Repetitive Transcranial Magnetic Stimulator with Monophasic and Biphasic Waveform

Thursday 31 August 2017 13:45 (1h 45m)

Transcranial magnetic stimulation (TMS) is a technique that uses time-varying magnetic field generated by pulsed coil current to induce time-varying electric field in the brain. It has been widely applied to neurological disease treatment and brain function research. Presently, the maximum usable repetitive rate of the stimulator is up to 100Hz, and the coil current normally used in TMS includes monophasic and biphasic pulses. The conventional monophasic waveform is less efficient than the biphasic pulse because of the electrical circuit, and most of the available repetitive TMS devices only provide biphasic pulse. However, as both waveforms may be preferably optimal in some applications, further study of devices that can efficiently generate these shapes at high stimulation rate is necessary. This paper presents a system topology, which is based on energy recycling method and can be used to realize both waveforms of monophasic and biphasic current for repetitive transcranial magnetic stimulator at high repetitive rate. The device system contains a LCC series-parallel resonant charging circuit, a storage capacitor, a parallel branch to the capacitor consisting of inductor and thyristor, a pair of reversed parallel discharge thyristors and an excitation coil. The energy lost during each discharge process is replenished by the resonant charging circuit, whereas the energy fed back to the storage capacitor is recycled through the parallel branch and discharge thyristors.
Based on the above design, we construct a prototype of the series-parallel resonant capacitor charge circuit and the energy-recovery discharge circuit. The experimental results show that the topology can improve the stimulation intensity at high repetitive rate with fairly low charging power, and provide both monophasic and biphasic waveforms at the same time.

Submitters Country

China

Primary authors: Ms ZUO, Jinxin (Huazhong University of Science and Technology); DING, Hongfa (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology); Ms FANG, Xiao (Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology)

Presenter: Ms ZUO, Jinxin (Huazhong University of Science and Technology)

Session Classification: Thu-Af-Po4.07

Track Classification: E9 - Novel and Other Applications