Mathematical Model and Apparatus to Optimize Functional Electrical Stimulation for Non-Isometric Limb Movement

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ABSTRACT

Researchers at the University of California, Davis have developed a mathematical model and apparatus capable of identifying optimal stimulation patterns to improve limb motion during functional electrical stimulation.

FULL DESCRIPTION

Functional electrical stimulation (FES) uses electrical currents to induce contractions in muscles and is used in therapy to restore functional movement in extremities affected by paralysis. Mathematical muscle models could help optimize stimulation patterns used by commercially available FES systems but the current mathematical models are limited to isometric conditions and a narrow range of stimulation patterns.

A Researcher at the University of California, Davis, working in cooperation with Researchers at the University of Delaware, have developed a method and apparatus capable of identifying optimal stimulation patterns that can be used to produce non-isometric functional movements. This method identifies the interpulse intervals and pulse intensities that should be used during FES to allow for more precise limb motion control and reduce muscle fatigue, improving the overall effectivness and efficiency of FES.

APPLICATIONS

- Feedforward and feedback limb control systems
- Functional electrical stimulation
- Real-time, non-isometric skeletal-muscle movement modeling

FEATURES/BENEFITS

- Can be used in real time
- Non-isometric movement modeling
- Reduced muscle fatigue
- More precise limb control
- Optimized FES stimulation pattern

RELATED MATERIALS

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PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,140,166	03/20/2012	2005-449

CONTACT

Michael M. Mueller
mmmueller@ucdavis.edu
tel: .

INVENTORS

- Wexler, Anthony S.

OTHER INFORMATION

KEYWORDS

functional electrical stimulation, FES, mathematical movement model, non-isometric, movement, limb motion, paralysis, stimulation pattern

CATEGORIZED AS

- **Imaging**
  - Other
- **Medical**
  - Devices
  - Therapeutics

RELATED CASES

2005-449-0

RELATED TECHNOLOGIES

- Myoelectrical Control of Multiple Channels Based on Single Muscle Contractions

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Biomimetic Chemical Compounds for Capturing Carbon Dioxide from Power Plant Stacks and the Atmosphere
- Myoelectrical Control of Multiple Channels Based on Single Muscle Contractions

University of California, Davis
Technology Transfer Office
1850 Research Park Drive, Suite 100, ,
Davis,CA 95618

Tel: 530.754.8649
techtransfer@ucdavis.edu
https://research.ucdavis.edu/technology-transfer/
Fax: 530.754.7620