Advances in functional electrical stimulation (FES)

D.B. Popović

References:

Abstract:
This review discusses the advancements that are needed to enhance the effects of electrical stimulation for restoring or assisting movement in humans with an injury/disease of the central nervous system. A complex model of the effects of electrical stimulation of peripheral systems is presented. The model indicates that both the motor and sensory systems are activated by electrical stimulation. We propose that a hierarchical hybrid controller may be suitable for functional electrical stimulation (FES) because this type of controller acts as a structural mimetic of its biological counterpart. Specific attention is given to the neural systems at the periphery with respect to the required electrodes and stimulators. Furthermore, we note that FES with surface electrodes is preferred for the therapy, although there is a definite advantage associated with implantable technology for life-long use. The last section of the review discusses the potential need to combine FES and robotic systems to provide assistance in some cases.

Keywords:
Neurorehabilitation, Mimetic model, Electrodes, Stimulators, Functional electrical stimulation