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PDF文档

肌肉动态收缩期间表面肌电信号的时频分析

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介绍了用于肌肉动态收缩期间非平稳表面肌电信号的时频分析方法。用短时傅里叶变换、Wigner-Ville分布及Choi-Williams分布计算了表面肌电信号的时频分布，用于信号频率内容随时间演化的可视化观察。通过计算瞬时频谱参数，对肌肉疲劳的电表现进行量化描述。分析了反复性的膝关节弯曲和伸展运动期间从股外侧肌所记录的表面肌电信号。发现和在静态收缩过程中观察到的平均频率线性下降不同，在动态收缩期间瞬时平均频率的变化过程是非线性的并且更为复杂，且与运动的生物力学条件有关。研究表明将时频分析技术应用于动态收缩期间的表面肌电信号可以增加用传统的频谱分析技术不能得到的信息。

TIME-FREQUENCY ANALYSIS OF SURFACE MYOELECTRIC SIGNALS DURING DYNAMIC CONTRACTIONS

The time-frequency method analyzed the nonstationary surface myoelectric signals during muscle dynamic contractions was introduced. The time-frequency distribution of the surface myoelectric signal was computed by means of STFT、Wigner-Ville distribution and Choi-Williams distribution. They are used for the visual inspection of the evolution of the frequency content of the signal. The myoelectric signals collected from vastus lateralis during repetitive knee flexion-extension exercise was analyzed. Un-like the linear decrease in mean frequency observed in static contractions, instantaneous median frequency behavior was non-linear and more complex during dynamic contractions, which related to biomechanical conditions of the exercise. The electrical manifestations of muscle fatigue were quantified by computing spectral parameters of each spectral estimate. The results showed that the application of time-frequency analysis to surface myoelectric signal during dynamic contraction may obtain more information that was not available using the traditional spectral analysis techniques.

关键词