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Natural time scales embedded in the mitoBK ion current dynamics

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We address the two-fold applicability of the power spectrum density of the large-conductance voltage- and Ca^{2+} -activated potassium channels of the inner mitochondrial membrane (mitoBK). First, we will address the estimation of the optimal sampling frequency for the fibroblast's mitoBK patch-clamp data analysis [1], employing the process with doubly harmonic diminution, known to produce pink noise [2]. Next, we will discuss the ion current's empirical modes [3] in detail. We will show that the consecutive mode's power spectra show known $1/f$ characteristics. The brief correspondence of the instantaneous frequencies to the actual time scales will also be presented.

[1] L. Machura, A. Wawrzekiewicz-Jalowiecka, P. Bednarczyk, and P. Trybek, Linking the Sampling Frequency with Multiscale Entropy to classify mitoBK patch-clamp data, *Biomed. Signal. Process. Control* 76, 103680 (2022).

[2] P.M. Riechers, J.P. Crutchfield, Fraudulent white noise: Flat power spectra belie arbitrarily complex processes, *Phys. Rev. Res.* 3 013170 (2021).

[3] N.E. Huang et al., The empirical mode decomposition and the Hilbert spectrum for nonlinear and non-stationary time series analysis, *Proc. R. Soc. Lond. A* 454.1971 (1998).

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