

Auto-correlation Function of the Maximum Wave Current in Polarography

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Antweiler first reported noise-like fluctuations in the 1st kind maximum wave current of a polarographic i - t curve.¹⁾ In connection with our series of investigations of the maximum wave current in polarography, we have recently obtained an auto-correlation function for these noise-like fluctuations with the use of a digitalized polarograph, where the mercury drop, voltage sweep and data sampling are synchronized.

The polarographic current of a drop of mercury at a constant voltage, *i. e.*, the i - t curve, is recorded automatically with the use of a digital computer (JEOL RA-5).

It is observed that the i - t curves are very smooth for the ordinary diffusion current, whereas, very noisy in the region of the maximum wave current.

Fig. 1 a shows a typical example for a system of 2.5 mM copper(II) sulfate as depolarizer and 0.1 M potassium chloride as supporting electrolyte.

The result of analysis of the auto-correlation function for the noise-like current in Fig. 1a-(i) is as shown in Fig. 1b. The Fourier components of the auto-correlation function are shown in Fig. 1c. The 1st largest peak of the power spectrum of Fig. 1c refers to the direct current component, and the 4th peak refers to that of about 17 Hz. Accordingly, there exists a dominant hidden periodicity in the noise-like fluctuations in Fig. 1a-(i).

The details of the instrumentation and of the discussion of the results will be published in this journal. Further investigation is in progress.

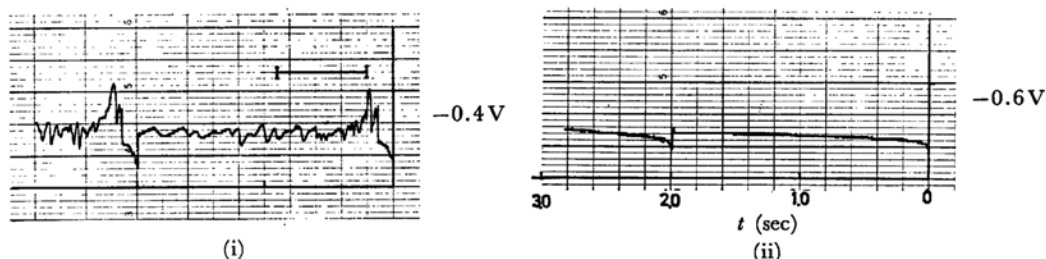


Fig. 1 a.

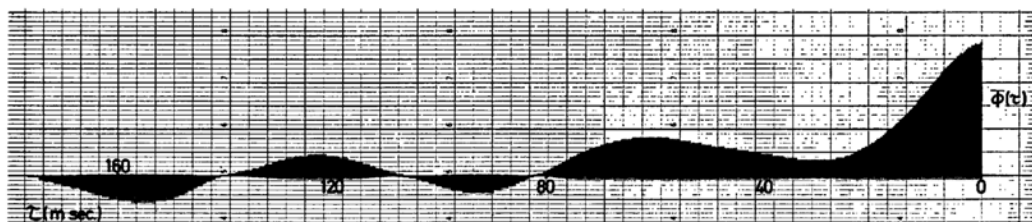


Fig. 1 b.

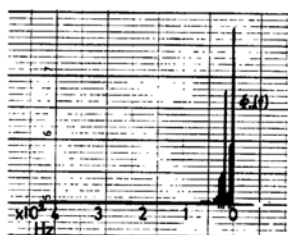


Fig. 1 c.

Fig. 1 a. Noise-like fluctuations in i - t curves at different voltages.

Chemical system

2.5 mM Copper sulfate as depolarizer

0.1 M Potassium chloride as supporting electrolyte

b. Auto-correlation function of the noise-like fluctuations in the portion indicated by I—I in Fig. 1a-(i).

c. Power spectrum of the noise-like fluctuations in the indicated portion in Fig. 1a-(i).

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1) H. J. Antweiler, *Z. Electrochem.*, **44**, 888 (1938).