

PACKAGE ID - 001344IBMPC00 ECN_PIT

KWIC TITLE - ElectroChemical Noise Data Acquisition and Interpretation

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LIMITATION CODE -COPY **AUDIENCE CODE** - LIM

COMPLETION DATE - 07/01/1998 **PUBLICATION DATE** - 07/01/1998

DESCRIPTION - This software is part of an effort to develop an effective measurement method, using electrochemical noise techniques, to differentiate localized pitting corrosion from general uniform corrosion. It is designed to obtain the electrochemical noise signal from in-situ electrochemical probes in a pipeline and convert the signal from a time-domain to a frequency domain by using a Fourier transform. The converted signal, named "power spectral density", is then further used to calculate the value of characteristic parameters which describe the mechanism and progress of a corrosion process. The results obtained from this software enable one to differentiate localized pitting corrosion from general uniform corrosion attack in a utility pipeline.

PACKAGE CONTENTS - Media Directory; Software Abstract; Media Includes Source Code;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD Rom

METHOD OF SOLUTION - ECN_PIT consists of two parts: a data acquisition program and a signal process program. The data acquisition software is used to collect the instant electrochemical noise current and voltage signal as measured on the electrochemical probes. The preliminary calculation of the standard deviation, the root mean square (RMS) value of the ac components, and the average of the instant current and voltage noise signals are measured in timed intervals and stored in a data file. The data file, which includes the RMS value of the ac components of voltage and current noise (called potential and current noise levels), the average potential and current values, and the standard deviations of potential and current noise, is then used by the signal processing program to calculate the Localized Index (LI = standard deviation of currentnoise/the RMS of current noise and the noise resistance (NR = average of voltage noise/average of current noise). The RMS of the ac components of the voltage and current noise data (in the time domain) are further converted, using the fast Fourier transform algorithm, to the power spectral density (PSD) (in the frequency domain). The slope of the PSD of voltage and current noise level are then calculated.

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COMPUTER - IBM PC

OPERATING SYSTEMS - Microsoft Windows 95

PROGRAMMING LANGUAGES - Matlab and Gamry Instrument Company script

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - ECN_PIT provides an innovative method to utilize the electrochemical noise signals to distinguish between the localized pitting corrosion and general uniform corrosion. The conceptual design for detecting the corrosion process, which is included in this software, can be applied to different industrial environments depending upon their specific needs for corrosion monitoring.

RELATED SOFTWARE - The data acquisition software (ECN_ANL) was written using the Gamry Instrument PC3 potentiostat and the program functions are from their CSM 100 version 3.01 software library.

OTHER PROG/OPER SYS INFO - ECN_ANL can only be operated in the environment created by Gamry Instrument's CSM100 version 3.01. ECN_SIG, the signal process software, is executed in the Matlab environment.

HARDWARE REQS - Hardware required includes an IBM-compatible personal computer with a 486 or above Intel or equivalent CPU and Gamry Instrument's PC3 potentiostat and computer interface card (used by the data acquisition program only).

ABSTRACT STATUS - Released AS-IS 8/24/2000

SUBJECT CLASS CODE - M

KEYWORDS -

SPECTRAL DENSITY
CORROSION
DATA ACQUISITION
DATA ANALYSIS
DATA PROCESSING
STATISTICS

EDB SUBJECT CATEGORIES -
990200

SPONSOR - DOE

PACKAGE TYPE - AS - IS