PACKAGE ID - 001131IBMPC00 TBATH,CALIB,POLYFIT

KWIC TITLE - Used to Calibrate Thermistors on In Situ Permeable Flow Sensors

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

COMPLETION DATE - 03/15/1994 **PUBLICATION DATE -** 03/15/1994

DESCRIPTION - The software package is comprised of three programs which together are used to calibrate thermistors in an In Situ Permable Flow Sensor. TBATH controls a temperature controlled bath/circulator. The code monitors the temperature of a set of previously calibrated thermistors located in a tank through which the fluid from the bath is circulated. After the temperature has reached and maintained thermal equilibrium for a specified period of time, the bath/circulator is instructed by the program to change the temperature set point to the next specified temperature. An arbitrary number of temperature calibration points can be specified allowing thermistors to be calibrated on a continuous basis without human intervention. CALIB is used to merge two data files that are collected during a temperature calibration run. During calibration of the thermistors on an In Situ Permeable Flow Sensor, the known temperatures in the temperaure controlled tank are recorded in one computer file in one format while the electrical resistance of the thermistors being calibrated is collected in a different file with a different format. This software reads in the two files and writes out a third file with all of the data in it that is required to calculate the calibration coefficients of the thermistors on the probe. POLYFIT is used to calculate the calibration coefficients which permit the temperature of a thermistor to ba calculated from its electrical resistance. During calibration of a thermistor, the electrical resistance of the thermistor is measured at four or more known temperatures and the data sent to this software. The program calculates the coefficients of a fourth order polynomial relating the inverse of the absolute temperature to the natural log of the electrical resistance. Once these coefficients are known, the polynomial can be evaluated with any measured electrical resistance to calculate the equivalent temperature.

PACKAGE CONTENTS - Media Directory; Software Abstract; Instructions for Running the Codes; Media Includes Source Code, Executables;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - In TBATH, temperature stability is determined by calculating the derivative of the temperature vs time in two user-specified time windows: one short (typically 30 minutes) and

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METHOD OF SOLUTION -(CONT) one longer (typically 90 minutes). When the rate of change of temperature with respect to time in both windows is less than user-specified criteria, the program concludes that the tank is at equilibrium and proceeds to the next temperature set point. Calib calculates the average temperature of a suite of reference thermometers in a specified time window, and the average electrical resistance of each thermistor being calibrated in the same time window, and writes the results to the output file. POLYFIT exploits the fact that the natural algorithm of the electrical resistance of a thermistor is very nearly linearly related to the inverse of the absolute temperature of the thermistor. POLYFIT calculates the four coefficients of a third order polynomial which relates these two quantities and writes the coefficients to the output device.

COMPUTER - IBM PC

OPERATING SYSTEMS - MSDOS Version 6.22

PROGRAMMING LANGUAGES - Borland Pascal v 7.0

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - There are no similar packages which to compare this program.

RELATED SOFTWARE - FLOW v 4.02.

OTHER PROG/OPER SYS INFO - TBATH is designed to work with specific temperature monitoring hardware (a Prema digital multimeter monitoring the electrical resistance of carefully calibrated thermistors), and with a specific temperature controlled bath/circulator (Neslab model RTE-221). The program communicates with the Prema multimeter via a National Instruments IEEE, GPIB board. Two files from National Instruments are required to compile and run this software: TBIB.OBJ and TPDECL.PAS. The National Instruments license we obtained with the software does not allow these files to be redistributed. Calib reads in data previously written to disk by TBATH and by Campbell Scientific software called TELCOM (in comma delimited ASCII format). POLYFIT accepts output files from CALIB.

HARDWARE REQS - 640 kilobytes of RAM.

TIME REQUIREMENTS - The time limitations for running TBATH depend on the thermal time constants of the bath/circulator and calibration tank, not on the computer hardware/software. CALIB and POLYFIT each require only seconds to run.

ABSTRACT STATUS - Submitted 12/4/96. Released AS-IS 12/23/96.

SUBJECT CLASS CODE - OH

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KEYWORDS -
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T CODES
CALIBRATION
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TEMPERATURE MEASUREMENT
FLOW COUNTERS

EDB SUBJECT CATEGORIES -
990200 440500

SPONSOR - DOE/DP

PACKAGE TYPE - AS - IS