PACKAGE ID - 000306I433100 TVENT1P

KWIC TITLE - Gas-Dynamic Transients Flow Networks

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LIMITATION CODE -UNL **AUDIENCE CODE -** UNL

COMPLETION DATE - 09/01/1987 **PUBLICATION DATE -** 09/01/1987

DESCRIPTION - TVENT1P predicts flows and pressures in a ventilation system or other air pathway caused by pressure transients, such as a tornado. For an analytical model to simulate an actual system, it must have (1) the same arrangement of components in a network of flow paths; (2) the same friction characteristics; (3) the same boundary pressures; (4) the same capacitance; and (5) the same forces that drive the air. A specific set of components used for constructing the analytical model includes filters, dampers, ducts, blowers, rooms, or volume connected at nodal points to form networks. The effects of a number of similar components can be lumped into a single one. TVENT1P contains a material transport algorithm and features for turning blowers off and on, changing blower speeds, changing the resistance of dampers and filters, and providing a filter model to handle very high flows. These features make it possible to depict a sequence of events during a single run. Component properties are varied using time functions. The filter model is not used by the code unless it is specified by the user. The basic results of a TVENT1P solution are flows in branches and pressures at nodes. A postprocessor program, PLTTEX, is included to produce the plots specified in the TVENT1P input. PLTTEX uses the proprietary CA-DISSPLA graphics software.

PACKAGE CONTENTS - NESC Note; Software Abstract; LA-10237-M; LA-7397-M; Media Includes Source, Sample Problem, Auxiliary Postprocessor, Control Information;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD Rom

METHOD OF SOLUTION - The continuity equation is satisfied at each node in the flow network with the dependent variable (pressure) solved simultaneously by point-wise (local) relaxation techniques. The flows are determined from the calculated pressures with experimental or classical flow descriptions. The boundary conditions are specified as stated but are arbitrary functions of time. The material transport algorithm is based on a simple convection model.

COMPUTER - IBM4331

OPERATING SYSTEMS - VM/CMS

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PROGRAMMING LANGUAGES - VS FORTRAN

SOFTWARE LIMITATIONS - Maxima of 500 branches, 400 nodes, 60 rooms, 50 boundary nodes, 25 plot frames with 4 plots per frame, 20 resistance functions, 20 removed branches, 20 removed nodes, 20 points per blower curve, 17 blower curves, 10 filter models, 10 blower speed functions, 5 material functions, 5 control dampers. Assumptions include one-dimensional, isothermal flow, lumped parameters (neglecting spatial distribution of components), and incompressible flow with fluid storage at nodes. TVENT1P does not include inertia or shock.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - TVENT1P is designed to be portable and is highly user oriented for architect-engineers and heating, ventilation, and air conditioning (HVAC) designers. The program is self-contained and does not require nonstandard system utilities. Line printer plots are generated.

RELATED SOFTWARE - The original IBM360 version of TVENT was prepared by K.H. Duerre, R.W. Andrae, and W.S. Gregory of Los Alamos National Laboratory.

OTHER PROG/OPER SYS INFO - Only one set of input data may be processed per execution. The program is structured as a one-level overlay to permit use on medium-size computers and to provide for program expansion. The auxiliary program, PLTTEX, is written in FORTRAN66.

HARDWARE REQS - The IBM4331 requires 540 Kbytes of memory.

TIME REQUIREMENTS - Running time depends on problem complexity, as well as the number of branches or nodes. NESC executed the sample problem in 1 CPU minute on an IBM4331.

REFERENCES - R.W. Andrae, P.K. Tang, and W.S. Gregory, TVENT1P User's Manual, A Computer Code for Analyzing Tornado-Induced Gas-Dynamic Transients in Flow Networks, LA-10237-M, September 1984; TVENT1P, NESC No. 809.4331, TVENT1P IBM Version Tape Description, National Energy Software Center Note 87-107, September 30, 1987; K.H. Duerre, R.W. Andrae, and W.S. Gregory, TVENT A Computer Program for Analysis of Tornado-Induced Transients in Ventilation Systems, LA-7397-M, July 1978, with Errata April 1979\ R.A. Martin, W.S. Gregory, C.I. Ricketts, P.R. Smith, P.E. Littleton, and D.V. Talbott, Analytical and Experimental Studies of Ventilation Systems Subjected to Simulated Tornado Conditions: Verification of the TVENT Computer Code, LA-11252-MS, April 1988.

ABSTRACT STATUS - Abstract first distributed February 1979. IBM360 version of TVENT submitted August 1978, replaced August 1979 by revised edition, replaced September 1987 by IBM4331 version of

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ABSTRACT STATUS -(CONT) TVENT1P submitted July 1985, sample problem executed by NESC July 1985 on an IBM4331.

SUBJECT CLASS CODE - H

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
T CODES
AIR FLOW
PRESSURE EFFECTS
VENTILATION SYSTEMS
NUCLEAR FACILITIES
TORNADOES
FLOW MODELS
TRANSIENTS

EDB SUBJECT CATEGORIES -
990200 420400 220900 220200

SPONSOR - DOE/EH

PACKAGE TYPE - TESTED