

**PACKAGE ID** - 001138MLTPL00 BDBSIM

**KWIC TITLE** - Block Diagram Simulator to Solve a  
User-Defined Network of Differential Equations

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

**COMPLETION DATE** - 01/01/1996   **PUBLICATION DATE** - 01/01/1996

**DESCRIPTION** - BDBSIM simulates control and protection systems found in fossil and nuclear power plants. The software is based on the identification of a general equation form that encompasses all control and protection equations encountered in these plants. The user enters his equations in block diagram form as a collection of individual dynamic function, logic, and table blocks. Constructing plant control equations in this manner is analogous to setting up an analog computer for simulation. The capability is thus sufficiently general for use in modeling a wide variety of control and protection systems.

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

**SOURCE CODE INCLUDED?** - Yes

**MEDIA QUANTITY** - 1 3.5 Diskette

**METHOD OF SOLUTION** - Given a user-defined block diagram that represents a set of differential equations, BDBSIM creates a set of problem definition tables to direct operation of a specialized differential equation solver. Automatic time-step control mechanisms adjust the integration time-step so that user specified accuracy limits are satisfied. This takes into account both the time behavior of the equations and the time behavior of the associated physical system that may be coupled or interacting with the equations. A separate algorithm is used to compute initial conditions for the equations that bring them into equilibrium with the associated physical system.

**COMPUTER** - MLT-PLTFM

**OPERATING SYSTEMS** - DOS, UNIX, VAX VMS

**PROGRAMMING LANGUAGES** - C or FORTRAN

**SOURCE CODE AVAILABLE (Y/N)** - Y

**UNIQUE FEATURES** - A preprocessor scans all input data and checks for inconsistencies. Diagnostics are printed.

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**RELATED SOFTWARE** - Software hooks are included to permit interfacing with the commercial MATLAB software package.

**TIME REQUIREMENTS** - The time required to simulate a control system depends on the time constants of the control equations and the number of equations used in the simulation. Due to the generally low order of the control systems found in power plants, real-time implementation is expected to be feasible.

**ABSTRACT STATUS** - Submitted 12/18/96. Released AS-IS 1/13/97

**SUBJECT CLASS CODE** - TK

**KEYWORDS** -

COMPUTER PROGRAM DOCUMENTATION  
B CODES  
FOSSIL-FUEL POWER PLANTS  
NUCLEAR POWER PLANTS  
THERMAL POWER PLANTS  
CONTROL SYSTEMS  
DIFFERENTIAL EQUATIONS  
SIMULATION  
NUMERICAL SOLUTION  
REACTOR MONITORING SYSTEMS

**EDB SUBJECT CATEGORIES** -

990200 220400 200100

**SPONSOR** - DOE/ER

**PACKAGE TYPE** - AS - IS