PACKAGE ID - 000556SUN0000 SSCMAG2.6

KWIC TITLE - Design and Optimize Superconducting Accelerator Magnets

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

COMPLETION DATE - 09/16/1991 **PUBLICATION DATE -** 09/15/1991

DESCRIPTION - SSCMAG is an integrated design package for designing the two dimensional magnetic cross section of superconducting particle accelerator magnets. SSCMAG consists of three functional sections. One function determines placement of the conductors to provide an optimized 2-D cross section, whereas, the second function examines the effects of non-optimal conductor placement and the effects of persistent currents and AC-losses. The last function integrates the first two functions and provides output suitable for input by other engineering design packages.

PACKAGE CONTENTS - Media Directory; Software Abstract; Installation Guide; MD-ENG-92-A-005; Media Includes Source Code, Executable Module, Compilation Instructions, Linking Instructions, Sample Problem Input and Output, User's Guide in Postscript;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - The optimizer approximates the magnet field of each conductor using two current sheets per conductor, at the correct keystone angle. An analytic solution the multiple field is made in complex coordinates for an infinite length current sheet inside an iron yoke of infinite permeability. A least squares optimization of the multiple components of the field is made by varying wedge sizes. The AC-loss function approximates the conductors as a set of infinite length line currents inside an iron yoke of infinite permeability. The field is found from the Biot-Savart law, whereas the eddy current and persistent current losses are found from empirical formulations.

COMPUTER - SUN

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OPERATING SYSTEMS - SUN OS4.1.2

PROGRAMMING LANGUAGES - FORTRAN 77 (99%), UNIX C-shell (1%)

SOFTWARE LIMITATIONS - Only works for one or two layer magnets. When optimizing the user must manually change the number of conductors between wedges. The optimizer searches for local minimum, not global minimum.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - The principal novel feature is the integrated aspect of the program. This allows the designer to develop an optimized design, examine the results of real world effects, and then pass the basic design onto more detailed design packages.

RELATED SOFTWARE - This software integrates the COP7 and AHARM programs developed at the SSCL. The IMSL mathematic libraries are required by the optimizer. Graphics is output in the form desired by the XGRAPH program. Output is generated that can be read by PE2D, an electromagnetic finite element program, by UNIGRAPHICS, a 3-D CAD program, and by BEND, a magnet end-part design program.

OTHER PROG/OPER SYS INFO - The IMSL mathematics libraries, PE2D, and UNIGRAPHICS are proprietary software packages.

HARDWARE REQS - Any SUN workstation is sufficient.

TIME REQUIREMENTS - Approximately 5 minutes for one optimization run or magnet margin calculation. All other operations take less than 1 minute.

REFERENCES - Billy J. Archer, David Orrell, and Gregory Snitchler, 'SSCMAG User's Manual', MD-ENG-92-A-005, August 1992.

ABSTRACT STATUS - Submitted January 1993. Released AS-IS May 17, 1994. The code compiles without error. A third party library is required to create the executable. The link of the code failed.

SUBJECT CLASS CODE - V

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
S CODES
COMPUTER-AIDED DESIGN
ACCELERATORS
TWO-DIMENSIONAL CALCULATIONS
DESIGN
MAGNETIC FIELDS
SUPERCONDUCTING MAGNETS

EDB SUBJECT CATEGORIES -
990200 430303

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SPONSOR - DOE/ER

PACKAGE TYPE - AS - IS