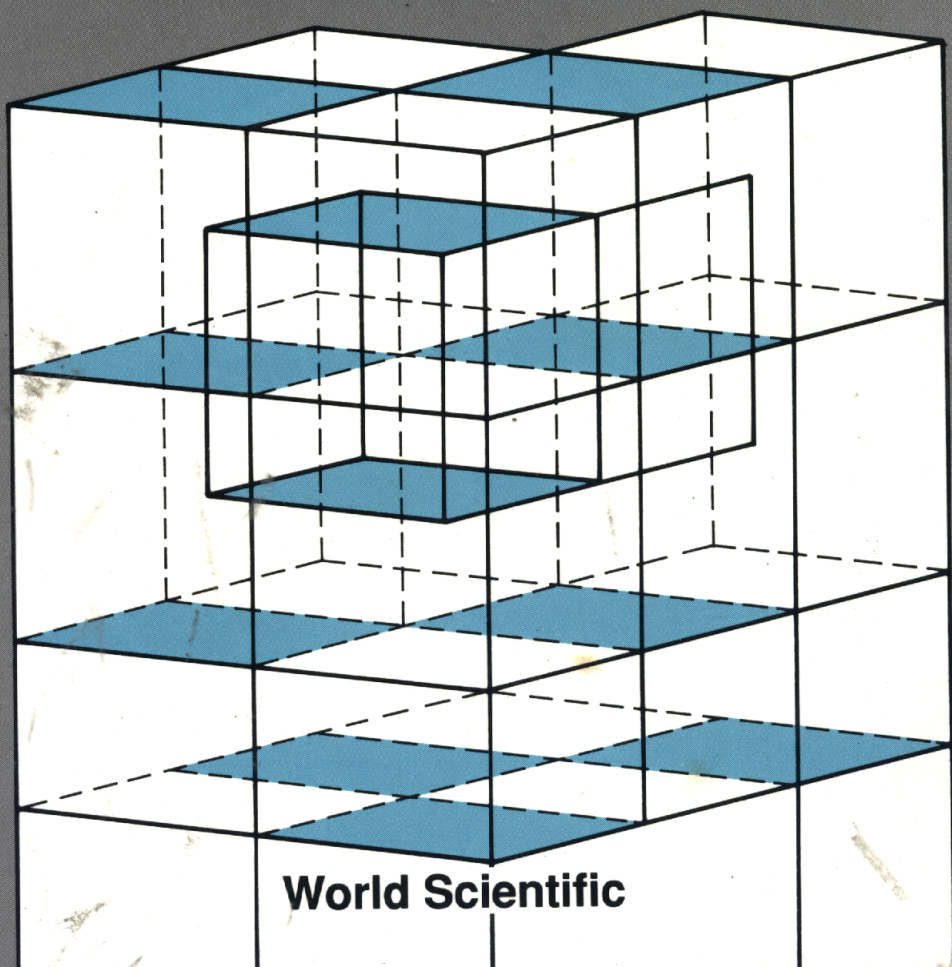
Studies in Josephson Supercomputers

ISSUES IN JOSEPHSON SUPERCOMPUTER DESIGN

Proceedings of the 6th and 7th RIKEN Symposia on Josephson Electronics

Editors

E. Goto K. F. Loe



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Issues in Josephson Supercomputer Design — Proceedings of the 6th and 7th RIKEN Symposia on Josephson Electronics
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Forthcoming:

Quantum Flux Parametron — A Single Quantum Flux Superconducting Logic Device
by W Hioe and E Goto

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D C Flux Parametron — A New Approach to Josephson Junction Logic
by E Goto and K F Loe

Fluxoid Josephson Computer Technology — Proceedings of the 3rd, 4th and 5th RIKEN-ERATO Symposia
Eds. E Goto, T Soma and K F Loe

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Preface

Quantum Flux Parametron (QFP) is a Josephson junction device which uses the polarities of a unit of quantum flux to represent a bit of binary information. The low power consumption and the inductive nature of signal transfer of Quantum Flux Parametron promise the realizability of a highly integrated Josephson supercomputer. The miniaturization and the inductively connected circuits pose new challenges and problems to the designers of such a computer system. In this volume we have collected five papers which provide the detailed illustrations of the essential problems in the design of Josephson supercomputers.

The essential problems include (i) the three-dimensional packaging problems in the highly integrated system, (ii) the detection of trapped magnetic quanta, (iii) the computation of three-dimensional inductance and (iv) the elimination or alleviation of various internal and external operational problems of Quantum Flux Parametron arising from the limitation of the current fabrication technology as well as the inherent problems of direct coupling of Quantum Flux Parametron.

The problem (i) is addressed in the paper "Basic Technology for Three-Dimensional Packaging", the problem (ii) is addressed in the papers "Gas Floating Method of Pick-up Coil for Detection of Flux Trapped in Superconductors" as well as "Magnetic Field Distribution Arising from a Trapped Fluxon", the problem (iii) is addressed in the paper "Three-Dimensional Inductance Calculation", and the problem (iv) is addressed in "QFP QFP Logic (QQL)".

Some of the basic background and related study of Josephson Supercomputer design based on Quantum Flux Parametron can be found in the series of books published by World Scientific Publishing. They are "DC Flux Parametron — A New Approach to Josephson Junction Logic" written by Goto, E. and Loe, K. F., "Fluxoid Josephson Computer Technology" edited by Goto, E., Soma, T. and Loe, K. F., as well as a forthcoming book "Quantum Flux Parametron — A Single Quantum Flux Superconducting Logic Device" written by Hioe, W. and Goto, E.

Goto, E. and Loe, K. F.
Dec 1, 1990

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