

ON THE DECIDABILITY OF MODEL-CHECKING FOR P SYSTEMS¹

ZHE DANG², CHENG LI²

*School of Electrical Engineering and Computer Science, Washington State University
Pullman, WA 99164, USA
e-mail: {zdang, cli}@eeecs.wsu.edu*

OSCAR H. IBARRA³

*Department of Computer Science, University of California
Santa Barbara, CA 93106, USA
e-mail: ibarra@cs.ucsb.edu*

and

GAOYAN XIE^{2,4}

*Dept. of Computer and Information Science, University of Massachusetts Dartmouth
North Dartmouth, MA 02747, USA
e-mail: gxie@umassd.edu*

ABSTRACT

Membrane computing is a branch of molecular computing that aims to develop models and paradigms that are biologically motivated. It identifies an unconventional computing model, namely a P system, from natural phenomena of cell evolutions and chemical reactions. Because of the nature of maximal parallelism inherent in the model, P systems have a great potential for implementing massively concurrent systems in an efficient way that would allow us to solve currently intractable problems. In this paper, we look at various models of P systems and investigate their model-checking problems. We identify what is decidable (or undecidable) about model-checking these systems under extended logic formalisms of CTL. We also report on some experiments on whether existing conservative (symbolic) model-checking techniques can be practically applied to handle P systems with a reasonable size.

Keywords: Membrane computing, P system, model-checking

1. Introduction

There has been a flurry of research activities in the area of membrane computing (a branch of molecular computing) initiated about five years ago by Gheorghe Paun [13].

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