

P.O.Box 8718, Beijing 100080, China	Journal of Software, Mar. 2005,16(3):384-391
E-mail: jos@iscas.ac.cn	ISSN 1000-9825, CODEN RUXUEW, CN 11-2560/TP
http://www.jos.org.cn	Copyright © 2005 by The Editorial Department of Journal of Software

一种分布式吴方法计算模型

武永卫, 杨广文, 杨 宏, 郑纬民, 林东岱

[Full-Text PDF](#) [Submission](#) [Back](#)

武永卫¹, 杨广文¹, 杨 宏², 郑纬民¹, 林东岱³

¹(清华大学 计算机科学与技术系, 北京 100084)

²(北京市计算中心, 北京 100005)

³(中国科学院 软件研究所, 北京 100080)

作者简介: 武永卫(1974—), 男, 甘肃靖远人, 博士, 主要研究领域为符号计算, 并行与分布式计算技术; 杨广文(1963—), 男, 博士, 教授, 主要研究领域为并行与分布式计算技术; 杨宏(1973—), 女, 工程师, 主要研究领域为符号计算, 计算机软件; 郑纬民(1946—), 男, 教授, 博士生导师, 主要研究领域为并行处理与分布计算机系统, 面向AI体系结构, 说明性语言的编译方法, 程序开发环境; 林东岱(1964—), 男, 博士, 研究员, 博士生导师, 主要研究领域为密码理论, 安全协议, 符号计算, 软件设计.

联系人: 武永卫 Phn: +86-10-62785592, E-mail: wuyw@tsinghua.edu.cn, http://www.tsinghua.edu.cn

Received 2004-02-10; Accepted 2004-05-14

Abstract

As Wu's method, based on symbolic computation, has found applications in more and more fields, it is challenged by more and more complicated calculation problems. The soul of the method, dividing and ruling problem, is very suitable for distributed computation. In this paper, a high performance computing technique is introduced into the symbolic computation and a distributed computing model (DCM) for Wu's method over Internet is put forward. First, the feasibility and requirement for distributed computation of Wu's method is analyzed. Then the data communications for big integers and polynomials are put forward in detail, and finally the design and implementation for DCM based on ELIMINO and Globus Toolkits 3 are presented.

Wu YW, Yang GW, Yang H, Zheng WM, Lin DD. A distributed computing model for Wu's method. *Journal of Software*, 2005,16(3):384-391.

<http://www.jos.org.cn/1000-9825/16/384.htm>

摘要

吴方法是由我国科学家吴文俊院士开创的一个新兴研究领域. 考虑到吴方法"分而治之"的思想非常适合分布式计算, 将分布式计算技术引入到该方法的计算过程中, 给出一种既可以在集群环境下, 也可以在网络环境下实现的分布式吴方法计算框架. 首先分析了吴方法分布式计算需求, 并以特征列计算为例来说明吴方法分布式计算算法, 然后讨论了符号计算基本数据类型: 大整数和多项式的消息传递方法, 最后简单给出了在网络环境下基于符号计算软件系统ELIMINO和网络中件间Globus Toolkits 3的分布式吴方法计算环境的设计、实现与实验结果.

基金项目: Supported by the National Natural Science Foundation of China under Grant Nos.60273007, 60373004, 60373005 (国家自然科学基金)

References:

- [1] Wu WT. On the decision problem and the mechanization of theorem in elementary geometry. *Scientia Sinica*, 1978,21:159-172.
- [2] Wu WT. Basic Principle of Mechanical Theorem Proving in Geometries (Part on Elementary Geometries). Beijing: Science Press, 1984 (in Chinese).
- [3] Wang DK, Zhi LH. Software development in MMRC. In: Yang W, Wang D, eds. Proc. of the ATCM'95. Singapore: Academic Press, 1995. 234-243.

- [4] Wang D. An implementation of the characteristic set method in Maple. In: Pfalzgraf J, Wang D, eds. Automated Practical Reasoning: Algebraic Approaches. New York: Springer-Verlag, 1998. 187-201.
- [5] Wang P. Parallel polynomial operations on SMPs: An overview. *Journal of Symbolic Computation*, 2001,11(1):377-396.
- [6] Rayes M, Wang P. Parallel GCD for sparse multivariate polynomials on shared memory multiple processors. In: Proc. of the PASCO'96. Washington: IEEE Press, 1996. 326-335.
- [7] Ajwa I, Wang P. Applying parallel/distributed computing to advanced algebraic computations. In: Proc. of the 1997 IEEE National Aerospace and Electronics Conf. Washington: IEEE Press, 1997. 156-164.
- [8] Lin DD, Wu YW, Yang H. Parallel computation for polynomial GCD. In: Zheng WM, Yang GW, Wu YW, eds. Proc. of the China National Computer Conf. Beijing: Tsinghua Press, 2003. 900-905 (in Chinese with English abstract).
- [9] Wu YW, Yang GW, Lin DD. On the parallel computation for characteristic set method. *Chinese Journal of Electronics*, 2004,18(3):383-388.
- [10] Wang P. Parallel univariate polynomial factorization on shared-memory multiple processors. In: Caviness B, Johnson J, eds. Proc. of the ISSAC'99. New York: ACM Press, 1999. 145-151.
- [11] Lin DD, Liu J, Liu ZJ. Mathematical research software: ELIMINO. In: Li ZB, ed. Proc. of the ACM'98. Lanzhou: Lanzhou University Press, 1998. 107-114.
- [12] Yang H, Liu Z, Lin D, Development of an object-oriented number system. *Mathematics Mechanization Research*, 2000,18: 212-219.

附中文参考文献:

- [2] 吴文俊. 定理机器证明基本原理(初等几何部分). 北京: 科学出版社, 1984.
- [8] 林东岱, 武永卫, 杨宏. 并行多项式最大公因子计算. 见: 郑纬民, 杨广文, 武永卫, 编. 2003年中国计算机大会论文集. 北京: 清华大学出版社, 2003. 900-905.