PAUL D. CODDINGTON

EDUCATION:

1983-88: Ph.D. in theoretical physics, University of Southampton, U.K.

1979-82: B.Sc. with first class honours in physics, double major in mathematics, University of Western Australia, Perth, Australia.

PROFESSIONAL EXPERIENCE:

1992-present: Research Scientist at the Northeast Parallel Architectures Center, Syracuse University.

- Leading a project to develop a real-time parallel renderer for digital terrain models, for an educational application involving an interactive flight simulation.
- Leading a project on the use of parallel computing in the power utility industry, in collaboration with Niagara Mohawk Power Corporation. This involves porting existing code to parallel computers, and developing parallel algorithms for sparse matrix computations, differential-algebraic equation solvers, and optimization techniques.
- Development of parallel algorithms for graph coloring and connected component labeling, random number generators, optimization techniques, and Monte Carlo simulation for various computational physics problems. This is done in conjunction with the National Software Exchange and High Performance Fortran Applications projects.
- Helped set up a World Wide Web server for NPAC.

1990-92: Research Associate in the Physics Department, Syracuse University, affiliated with the Northeast Parallel Architectures Center.

- Developed sequential and parallel Monte Carlo algorithms for simulations of spin models of magnetism and random surfaces models of quantum gravity.
- Wrote sequential and parallel Fortran programs for the High Performance Fortran test suite.
- Studied the the use of networks of workstations for parallel computing.

1988-90: Research Fellow in the Physics Department, working in the Caltech Concurrent Computation Group, California Institute of Technology, Pasadena, U.S.A.

- Developed parallel algorithms for non-local Monte Carlo cluster algorithms for spin models of magnetism, including parallel connected component labeling algorithms for different parallel computer architectures.

1987-88: Research Assistant in the Concurrent Computation Group of the Department of Electronics and Computer Science and the Transputer Support Center, University of Southampton, U.K.

- Implemented parallel matrix algorithms on transputer arrays.
- Ported a sequential Fortran code modeling ocean current flow to a transputer array.
- Helped set up and run the Transputer Support Center, a campus-affiliated training and consultancy center.
- Wrote and modified demonstration programs and documentation for training courses.

1986-87: Research Assistant in the Physics Department, University of Southampton, U.K.

- Developed parallel algorithms for transputer arrays to perform numerical studies of problems in quantum field theory and condensed matter physics, including simulations of models of magnetism and the quantum Hall effect.

TECHNICAL EXPERTISE

10 years experience in high-performance parallel computing. Parallel computers used include the Encore Multimax, Sequent Symmetry, BBN Butterfly, ICL and AMT DAP, Thinking Machines CM-2 and CM-5, Maspar MP-100, Meiko Computing Surface, nCUBE/10, nCUBE/2, Intel iPSC, Symult S2010, Intel Touchstone Delta, IBM SP-1, as well as networks of Sun, DEC, IBM, and Hewlett-Packard workstations. Familiar with Pascal, Fortran 77, C, perl, DAP Fortran, *Lisp, CM Fortran, C*, Fortran 90, High Performance Fortran, occam, Express C and Fortran, MPL, MP Fortran.

SELECT PUBLICATIONS

1. G.C. Fox and P.D. Coddington, *Parallel Computers and Complex Systems*, in T. Bossomaier and D. G. Green, editors, *Complex Systems*, (Cambridge University Press, Cambridge, in press).

2. G.C. Fox and P.D. Coddington, *An Overview of High Performance Computing for the Physical Sciences*, Proceedings of the Mardi Gras Conference on High Performance Computing and Its Applications in the Physical Sciences, Baton Rouge, LA (February 1993), ed. D.A. Browne *et al.*, (World Scientific, Singapore, 1994).

3. P.D. Coddington, *Analysis of Random Number Generators Using Monte Carlo Simulation*, Int. J. Mod. Phys. C, in press.

4. P.D. Coddington, *An Analysis of Distributed Computing Software and Hardware for Applications in Computational Physics*, Proceedings of the Second International Symposium on High Performance Distributed Computing (HPDC-2), Spokane, WA (July 1993).

5. J. Apostolakis, P. Coddington and E. Marinari, *New SIMD Algorithms for Cluster Labeling on Parallel Computers*, Int. J. Mod. Phys. C **4**, 749 (1993).

6. C.F. Baillie and P.D. Coddington, *Cluster Identification Algorithms for Spin Models — Sequential and Parallel*, Concurrency: Practice and Experience **3**, 129 (1991).

7. M. Bowick, P. Coddington, L. Han, G. Harris and E. Marinari, *The Phase Diagram of Fluid Random Surfaces with Extrinsic Curvature*, Nucl. Phys. B **394**, 791 (1993).

8. P.D. Coddington and C.F. Baillie, *Empirical Relations Between Static and Dynamic Exponents for Ising Model Cluster Algorithms*, Phys. Rev. Lett. **68**, 962 (1992).

9. C.F. Baillie and P.D. Coddington, *Comparison of Cluster Algorithms for 2-D Potts Models*, Phys. Rev. B **43**, 10617 (1991).

10. P. Coddington, A. Hey, J. Mandula and M. Ogilvie, *The Lattice Photon Propagator*, Phys. Lett. **B197**, 191 (1987).