Table 4: Industrial HPCC Applications 6 to 10: SIMULATION

Item	Application Area and Examples	Problem Comments	Machine and Software
6	**Environmental Phenomenology** —Complex Systems, (Lead Concentration in blood)	• Empirical Models • Monte Carlo and Histograms	• Some SIMD but • MIMD more natural • HPF
7	**Basic Chemistry** • Chemical Potentials • Elemental Reaction Dynamics	• Calculate Matrix Elements • Matrix Eigenvalue determination, Inversion, Multiplication	• Probably SIMD with perhaps SIMD possible • HPF
8	**Molecular Dynamics** in Physics & Chemistry • Biochemistry • Discrete Simulation Monte Carlo for CFD (DSMC) • Particle in the Cell (PIC)	• Particle Dynamics with irregular cutoff forces • Fast Multipole Methods • Mix of PDE and Particle methods in PIC and DSMC	• HPF(+) except • need MPF for fast multipole
9	**Economic Modelling** • Real Time Optimization • Mortgaged backed Securities • Option Pricing	Single financial instrument by Monte Carlo	SIMD, HPF
		Full Simulations of complete portfolios	MIMD or SIMD with Integration Software
10	**Network Simulations** • Electrical Circuit • Microwave and VLSI • Biological (neural) Circuit	• Sparse matrices • Zero structure defined by connectivity	MIMD HPF for matrix elements MPF or library for matrix solve