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common errors; 3.3. Principal drawbacks of this formulation; 3.3.1. Distribution bias; 3.3.2. Explosion and maximum velocity; 3.4. Manual parameter setting; 3.5. For "amateurs": average number of informants; 3.6. Summary; Chapter 4. Benchmark Set; 4.1. What is the purpose of test functions?; 4.2. Six reference functions; 4.3. Representations and comments; 4.4. For "amateurs": estimates of levels of difficulty; 4.4.1. Theoretical difficulty; 4.4.1.1. Tripod; 4.4.1.2. Alpine 10D; 4.4.1.3. Rosenbrock; 4.4.2. Difficulty according to the search effort; 4.5. Summary; Chapter 5. Mistrusting Chance; 5.1. Analysis of an anomaly; 5.2. Computing randomness; 5.3. Reproducibility; 5.4. On numerical precision; 5.5. The rare KISS; 5.5.1. Brief description; 5.5.2. Test of KISS; 5.6. On the comparison of results; 5.7. For "amateurs": confidence in the estimate of a rate of failure; 5.8. C programs; 5.9. Summary; Chapter 6. First Results; 6.1. A simple program; 6.2. Overall results; 6.3. Robustness and performance maps; 6.4. Theoretical difficulty and noted difficulty; 6.5. Source code of OEP 0; 6.6. Summary; Chapter 7. Swarm: Memory and Graphs of Influence; 7.1. Circular neighborhood of the historical PSO; 7.2. Memory-swarm; 7.3. Fixed topologies; 7.4. Random variable topologies; 7.4.1. Direct recruitment; 7.4.2. Recruitment by common channel of communication; 7.5. Influence of the number of informants; 7.5.1. In fixed topology; 7.5.2. In random variable topology; 7.6. Influence of the number of memories; 7.7. Reorganizations of the memory-swarm; 7.7.1. Mixing of the memories; 7.7.2. Queen and other centroids; 7.7.3. Comparative results; 7.8. For "amateurs": temporal connectivity in random recruitment; 7.9. Summary; Chapter 8. Distributions of Proximity; 8.1. The random possibilities; 8.2. Review of rectangular distribution; 8.3. Alternative distributions of possibilities; 8.3.1. Ellipsoidal positive sectors; 8.3.2. Independent Gaussians; 8.3.3. Local by independent Gaussians; 8.3.4. The class of one-dimensional distributions; 8.3.5. Pivots; 8.3.6. Adjusted ellipsoids

## Sommario/riassunto

This is the first book devoted entirely to Particle Swarm Optimization (PSO), which is a non-specific algorithm, similar to evolutionary algorithms, such as taboo search and ant colonies. Since its original development in 1995, PSO has mainly been applied to continuous-discrete heterogeneous strongly non-linear numerical optimization and it is thus used almost everywhere in the world. Its convergence rate also makes it a preferred tool in dynamic optimization.