

O 6. MANTA RAY OPTIMIZATION ALGORITHM FOR SOLVING DEFINITE INTEGRALS

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ABSTRACT: This study proposes a newly emerged bio-inspired metaheuristic problem-solving method called Manta-ray optimization algorithm for solving definite integral problems. Inspired from the foraging behavior of intelligent manta rays, the proposed method emulates three intrinsic food search mechanisms of manta rays which include chain foraging, cyclone foraging, and somersault foraging. Collective application of these three foraging mechanisms forms a unique problem-solving strategy to overcome hard-to-solve real-world optimization problems. The optimization performance of the proposed method is evaluated on four real world engineering optimization problems which are efficient testbeds for assessing the diversification and exploitation capacity of any optimization algorithm. Furthermore, numerical results retrieved from Manta-Ray algorithm is benchmarked against some of the literature famous optimization methods of Particle Swarm Optimization, Differential Evolution, and Crow Search Algorithm. The superiority of the Manta Ray Optimization is so evident that it surpasses the compared optimization algorithms in each test problem with regard to solution efficiency and accuracy. Finally, the proposed method is applied to five different definite integral problems and corresponding numerical results show that the algorithm offers a plausible and efficient way to solve integral problems with higher accuracy and robustness.

Keywords: *Definite integrals, Manta Ray Optimization Algorithm, Metaheuristics.*