Enhanced Polarization Learning Optimizer (EPLO)

Purpose

Robust optimization for constrained engineering designs and dynamic planning (UAV/WSN)

Method

Sobol initialization

Polarized multi-group learning

Elite migration

Nonlinear adaptive schedules

Lévy refinement + gradients

Conclusion

Balanced exploration–exploitation via adaptive polarized learning

Key findings

Faster convergence and robustness vs baselines

Nonlinear schedules — Lévy+gradients

Best on CEC2022 and five designs

Effective in UAV planning and WSN localization

Legend: Sobol — Polarized groups — Elite migration — Nonlinear schedules — Lévy+gradients