Algorithm 1: MS-EPSO pseudocode

Input: Objective function *f(x)*, *D*, *LB*, *UB*, *NP*, *NFE*, τ, *CP*, *NR*, *MLL*

Output: Best solution found $P_g = \{x_1, x_2, x_3, ..., x_D\}$

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// After each function evaluation:
// 1) Increment FEs counter;
// 2) Check for a possible new global best;
// 3) Check the stopping criteria.
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$FEs \leftarrow 0$
$MaxV \leftarrow abs(UB - LB)$
$MinV \leftarrow MaxV * -1$
for $i \leftarrow 0$ *to* **to** NP **do**
    Initialize particle (x_i) between [LB, UB]
    Initialize velocity (v_i) between [MinV, MaxV]
    Initialize strategic weights (w^*_{i1}, w^*_{i2}, w^*_{i3}, w^*_{i4}) between [0, 1]
    Initialize local limit (PLL_i) $\leftarrow 0$
    Initialize exploration mode (EXP_i) $\leftarrow 1$
    $x_{i\mu} \leftarrow \mu(x_i)$
    $x_{i\sigma} \leftarrow \sigma(x_i)$
    $x_{if} \leftarrow f(x_i)$
end
Save all local best information ($\hat{x}_i, \hat{x}_{if}, \hat{x}_{i\mu}, \hat{x}_{i\sigma}$)
Save global best information ($x_g, x_{gf}, x_{g\mu}, x_{g\sigma}$)
repeat
    for $i \leftarrow 0$ *to* **to** NP **do**
        $Rule_1 \leftarrow PLL_i < MLL \wedge EXP_i$? 1 : 0
        $Rule_2 \leftarrow PLL_i < MLL \wedge \neg EXP_i$? 1 : 0
        $Rule_3 \leftarrow PLL_i \geq MLL$? 1 : 0
        if $Rule_1$ **then**
            $x_{new} \leftarrow$ DrawFromGaussianDistribution($x_{g\mu}, x_{g\sigma}$, D) `// D samples`
            $x_{newf} \leftarrow f(x_{new})$
            $best_{replica} \leftarrow$ GenerateReplicas(NR, w^*_i, τ) `// EPSO strategy`
            $best_{replicaf} \leftarrow f(best_{replica})$
        end
        if $Rule_2$ **then**
            $best_{replica} \leftarrow$ GenerateReplicas(NR, w^*_i, τ) `// EPSO strategy`
            $best_{replicaf} \leftarrow f(best_{replica})$
            $x_{new} \leftarrow$ MoveParticle($x_i, v_i, \hat{x}_i, x_g, CP$) `// EPSO Movement`
            $x_{newf} \leftarrow f(x_{new})$
        end
        if $Rule_3$ **then**
            $x_{new} \leftarrow$ DrawFromGaussianDistribution($\hat{x}_{i\mu}, \hat{x}_{i\sigma}$, D) `// D samples`
            $x_{newf} \leftarrow f(x_{new})$
            $best_{replica} \leftarrow$ GenerateReplicas(NR, w^*_i, τ) `// EPSO strategy`
            $best_{replicaf} \leftarrow f(best_{replica})$
            $PLL_i \leftarrow 0$
            $EXP_i \leftarrow 0$
        end
        $x_i, x_{if}, v_i, w^*_i \leftarrow Compare(x_{new}, best_{replica})$
        $\hat{x}_i, \hat{x}_{if}, NewLocalBest? \leftarrow Compare(x_i, \hat{x}_i)$
        if *NewLocalBest* **then**
            $\hat{x}_{i\mu} \leftarrow \mu(\hat{x}_i)$
            $\hat{x}_{i\sigma} \leftarrow \sigma(\hat{x}_i)$
        else
            $PLL_i \leftarrow PPL_i + 1$
        end
    end
until $FEs == NFE$