Optimality assesment

Start

Initialize design optimality vector
$\mathbf{N}_E = \left[n_{E1}\, n_{E2} \cdots n_{E\beta} \right]^{\mathrm{T}} = \mathbf{0}$

Sample a requirement arc from Ω_R

Solve
$\min_{\{c,\mathbf{S}\}} \; f(c,\mathbf{S},\mathbf{R}_w)$
subject to $\mathbf{g}(c,\mathbf{S},\mathbf{R}_w) \le \mathbf{0}$

Optimum decision arc
$\mathbf{x}_S^*(\mathbf{R}_w) = \{c^*, \mathbf{S}^*\}$

Optimum design arc
$\mathbf{x}^*(\mathbf{R}_w) = \{c^*, \mathbf{D}^*\}$

Augment set of parameteric optimal design arcs
$S_E^* = \{\mathbf{x}^*(\mathbf{R}_1), \mathbf{x}^*(\mathbf{R}_2), \cdots, \mathbf{x}^*(\mathbf{R}_w)\}$

Award design arc in $\mathbf{N}_E$
$n_{E\lambda} \leftarrow n_{E\lambda} + 1$

All samples evaluated? — *no* → $w \leftarrow w+1$

yes

α design arcs with largest values $n_{E\lambda}$

Set of optimal design arcs
$S_E = \{\{c,\mathbf{D}\}_{E1}, \{c,\mathbf{D}\}_{E2}, \cdots, \{c,\mathbf{D}\}_{E\alpha}\}$

Stop

Set of optimal design arcs with respect to excess

Robustness and flexibility assessment

Start

Initialize design robustness vector
$\mathbf{N}_R = \left[n_{R1}\, n_{R2} \cdots n_{R\beta} \right]^{\mathrm{T}} = \mathbf{0}$

Sample design arc from Ω_{cD}

Sample a requirement arc from Ω_R

Generate a decision arc
$\{c,\mathbf{S}\}_\gamma$

Check reliability constraint
$\mathbf{g}(c,\mathbf{S},\mathbf{R}_w) \le \mathbf{0}$? — *no* → all enumerations generated? $\gamma = \xi$? — *no* → $\gamma \leftarrow \gamma+1$

yes

$\{c,\mathbf{D}\}_\lambda$ satisfies requirement $\mathbf{R}_w$

Award design arc
$n_{R\lambda} \leftarrow n_{R\lambda} + 1$

$\{c,\mathbf{D}\}_\lambda$ does not satisfy requirement $\mathbf{R}_w$

Do not award design arc
$n_{R\lambda} \leftarrow n_{R\lambda} + 0$

$\lambda \leftarrow \lambda+1$

$w \leftarrow w+1$

Update design robustness vector
$\mathbf{N}_R = \left[n_{R1}\, n_{R2} \cdots n_{R\beta} \right]^{\mathrm{T}}$

All samples evaluated? — *no* → Sample design arc from Ω_{cD}

yes

Compute filtered outdegree
$O_{F_\lambda} = q - o$

Augment design flexibility vector
$\mathbf{N}_F = \left[O_{F_1}\, O_{F_2} \cdots O_{F_\lambda} \right]^{\mathrm{T}}$

All samples evaluated? — *no* → Sample design arc from Ω_{cD}

yes

Stop

α design arcs with largest values $n_{R\lambda}$

Set of robust design arcs

α design arcs with largest values O_{F_λ}

Set of flexible design arcs