

An Intelligent Interactive Design System for Greener and Customer-Centred Ship Design

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APPENDIX 1

Algorithm: The pseudo-code of Generative Design Technique (GDT)

- 1: **function** $GDT(\mathcal{X}, N, s)$
 - 2: **Input:** Create a parent hull m and parametrise it with n geometric parameters $(x_{m,1}, x_{m,2}, \dots, x_{m,n})$.
 - 3: **Input:** Initialise number of designs to be created (N), spopulation size (s) and number of iterations i .
 - 4: **Input:** Define the design space with lower and upper bounds of n parameters, $\mathcal{X} := \{x_{m,k}^l \leq x_{m,k} \leq x_{m,k}^u \forall k \in \{1, 2, \dots, n\}\}$.
 - 5: Randomly create an initial population ($\mathbf{P}$) of size s .
 - 6: Run i iterations using a multi-objective optimiser to generate a set $\mathcal{P}$ of Pareto Optimal solutions.
 - 7: **if** Size of $\mathcal{P}$ (n_p) is greater than N (i.e. $N_p > N$) **then**
 - 8: Prune $\mathcal{P}$ to reduce its size to N
 - 9: **end if**
 - 10: Set $\mathcal{N}_{op} \leftarrow \mathcal{P}$
 - 11: **return** Optimal design set $\mathcal{N}_{op} = \{\mathbf{x}_{p_1}, \mathbf{x}_{p_2}, \dots, \mathbf{x}_{p_N}\}$.
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