# Enhancing Reliability Engineering through Optimized Integration of Mixed Data Sources: A Synergistic Approach Using Physical Experiments and Simulation Techniques

Table 1. Percentile of calculated maximum in original problem bounds

| **Function** | **Percentile of Solution** | | | | |
|---|---|---|---|---|---|
| d | fwIoU↑ | fwIoU↑ | mSSIM↑ | mPSNR↑ | mL1↓ |
| ackley | 99.43 | 95.19 | 99.39 | 98.61 | 99.39 |
| beale | 99.51 | 96.02 | 96.56 | 99.53 | 96.56 |
| bird | 99.79 | 99.94 | 98.58 | 99.32 | 98.58 |
| booth | 99.87 | 67.38 | 98.31 | 99.02 | 98.31 |
| bukin4 | 99.55 | 66.66 | 99.57 | 96.53 | 99.57 |
| bukin6 | 98.62 | 94.19 | 99.38 | 99.63 | 99.38 |
| carromtable | 95.07 | 99.74 | 94.09 | 94.01 | 94.09 |
| chichinadze | 99.37 | 94.72 | 99.37 | 98.99 | 99.37 |
| crossfunc | 14.14 | 52.80 | 38.22 | 22.78 | 38.22 |
| crossintray | 99.02 | 99.48 | 98.74 | 99.72 | 98.74 |
| crosslegtable | 86.77 | 86.77 | 58.32 | 52.38 | 58.32 |
| crownedcross | 98.27 | 98.31 | 97.47 | 99.99 | 97.47 |
| cube | 99.51 | 69.51 | 97.51 | 92.51 | 97.51 |
| easom | 50.04 | 50.04 | 50.04 | 50.04 | 50.04 |
| eggholder | 99.51 | 98.51 | 99.51 | 98.51 | 99.51 |
| gaussian_min_max | 99.22 | 99.30 | 99.26 | 97.46 | 99.26 |
| giunta | 97.51 | 72.51 | 96.51 | 98.51 | 96.51 |
| goldsteinprice | 97.96 | 87.52 | 99.38 | 99.46 | 99.38 |
| griewank | 99.94 | 65.22 | 99.64 | 99.90 | 99.64 |
| helicalvally_min_max | 99.93 | 97.66 | 98.86 | 99.25 | 98.86 |
| himmelblau | 95.49 | 88.12 | 100.0 | 99.98 | 100.0 |
| holdertable | 98.95 | 98.42 | 94.98 | 99.32 | 94.98 |
| leon | 99.48 | 86.49 | 98.37 | 99.35 | 98.37 |
| levi13 | 99.68 | 76.51 | 99.75 | 99.99 | 99.75 |
| logarithmic_min_max | 99.72 | 98.64 | 86.54 | 93.99 | 86.54 |
| matyas | 99.40 | 97.41 | 93.75 | 94.71 | 93.75 |
| mccormick | 98.67 | 86.85 | 98.89 | 99.27 | 98.89 |
| modschaffer1 | 72.16 | 96.32 | 59.90 | 34.33 | 59.90 |
| modschaffer2 | 60.18 | 39.89 | 99.82 | 99.48 | 99.82 |
| modschaffer3 | 41.45 | 71.93 | 62.81 | 69.25 | 62.81 |
| modschaffer4 | 85.93 | 99.77 | 66.97 | 64.61 | 66.97 |
| penholder | 99.14 | 93.40 | 99.50 | 91.20 | 99.50 |
| perlin | 99.92 | 99.30 | 98.54 | 98.58 | 98.54 |
| rastrigin | 99.97 | 91.57 | 99.91 | 99.31 | 99.91 |
| rosenbrock | 99.51 | 90.51 | 98.51 | 94.51 | 98.51 |
| schweffel | 98.94 | 99.97 | 98.56 | 99.23 | 98.56 |
| sinenvsin | 50.01 | 37.01 | 61.01 | 33.01 | 61.01 |
| sixhumpcamel | 98.84 | 87.16 | 99.30 | 98.98 | 99.30 |
| testtubeholder | 99.12 | 98.89 | 99.97 | 99.78 | 99.97 |
| threehumpcamel | 98.09 | 83.06 | 99.77 | 99.38 | 99.77 |
| zettl | 95.06 | 92.96 | 97.44 | 99.87 | 97.44 |