TABLE SI
MULTI-OBJECTIVE MULTITASK OPTIMIZATION PROBLEMS.

Problem	sim	Task No.	Task
CIHS	0.97	T_1	$f_1 = q(x)cos(\frac{\pi x_1}{2}), f_2 = q(x)sin(\frac{\pi x_1}{2}), q(x) = 1 + \sum_{i=2}^{n} x^2$
		T_2	$f_1(x) = x_1, f_2(x) = q(x)(1 - (\frac{x_1}{q(x)})^2), q(x) = 1 + \frac{9}{n-1}\sum_{i=2}^{n} \lvert x_i \rvert$
CIMS	0.52	T_1	$f_1 = x_1, f_2(x) = q(x)\left(1 - \left(\frac{x_1}{q(x)}\right)^2\right)$, $q(x) = 1 + \sum_{i=2}^{n-1}\left(100\left(x_i^2 - x_{i+1}\right)^2 + (1 - x_i)^2\right)$
		T_2	$f_1 = q(x)cos(\frac{\pi x_1}{2}), f_2 = q(x)sin(\frac{\pi x_1}{2}), q(x) = 1 + \sum_{i=2}^{n} x^2$
CILS	0.07	T_1	$f_1 = q(x)cos(\frac{\pi x_1}{2}), f_2 = q(x)sin(\frac{\pi x_1}{2}), q(x) = 1 + \sum_{i=2}^{n}\left(x_i^2 - 10\cos(2\pi x_i) + 10\right)$
		T_2	$f_1 = x_1, f_2 = q(x)(1 - \sqrt{\frac{x_1}{q(x)}}), \quad q(x) = 21 + e - 20\exp(-0.2\sqrt{\frac{1}{n-1}\sum_{i=2}^{n} x_i^2}) - \exp\left(\frac{1}{n-1}\sum_{i=2}^{n}\cos(2\pi x_i)\right)$
PIHS	0.07	T_1	$f_1(x) = x_1, f_2 = q(x)(1 - \sqrt{\frac{x_1}{q(x)}}), q(x) = 1 + \sum_{i=2}^{n} x^2$
		T_2	$f_1 = x_1, f_2 = q(x)(1 - \sqrt{\frac{x_1}{q(x)}}), q(x) = 1 + \sum_{i=2}^{n}\left(x_i^2 - 10\cos(2\pi x_i) + 10\right)$
PIMS	0.55	T_1	$f_1(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right), f_2(x) = q(x)\sin\left(\frac{\pi x_1}{2}\right), q(x) = 1 + \sum_{i=2}^{n} x_i^2$
		T_2	$f_1(x) = x_1, f_2(x) = q(x)\left(1 - \left(\frac{x_1}{q(x)}\right)^2\right), q(x) = 1 + \sum_{i=2}^{n}\left(x_i^2 - 10\cos(2\pi x_i) + 10\right)$
PILS	0.002	T_1	$f_1(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right), f_2(x) = q(x)\sin\left(\frac{\pi x_1}{2}\right), q(x) = 2 + \frac{1}{4000}\sum_{i=2}^{n} x_i^2 - \prod_{i=2}^{n}\cos\left(\frac{x_i}{\sqrt{i-1}}\right)$
		T_2	$f_1(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right), f_2(x) = q(x)\sin\left(\frac{\pi x_1}{2}\right), q(x) = 21 + e - 20\exp(-0.2\sqrt{\frac{1}{n-1}\sum_{i=2}^{n} z_i^2}) - \exp\left(\frac{1}{n-1}\sum_{i=2}^{n}\cos(2\pi z_i)\right)$
NIHS	0.94	T_1	$f_1(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right), f_2(x) = q(x)\sin\left(\frac{\pi x_1}{2}\right), q(x) = 1 + \sum_{i=2}^{n-1}\left(100\left(x_i^2 - x_{i+1}\right)^2 + (1 - x_i)^2\right)$
		T_2	$f_1(x) = x_1, f_2(x) = q(x)(1 - \sqrt{\frac{x_1}{q(x)}}), q(x) = 1 + \sum_{i=2}^{n} x_i^2$
NIMS	0.51	T_1	$f_1(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right)\cos\left(\frac{\pi x_2}{2}\right), f_2(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right)\sin\left(\frac{\pi x_2}{2}\right), f_3(x) = q(x)\sin\left(\frac{\pi x_1}{2}\right), q(x) = 1 + \sum_{i=3}^{n-1}\left(100\left(x_i^2 - x_{i+1}\right)^2 + (1 - x_i)^2\right)$
		T_2	$f_1(x) = \frac{1}{2}(x_1 + x_2), f_2(x) = q(x)\left(1 - \left(\frac{x_1 + x_2}{2 \cdot q(x)}\right)^2\right), q(x) = 1 + \sum_{i=3}^{n} z_i^2$
NILS	0.001	T_1	$f_1(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right)\cos\left(\frac{\pi x_2}{2}\right), f_2(x) = q(x)\cos\left(\frac{\pi x_1}{2}\right)\sin\left(\frac{\pi x_2}{2}\right), f_3(x) = q(x)\sin\left(\frac{\pi x_1}{2}\right), q(x) = 2 + \frac{1}{4000}\sum_{i=3}^{n} z_i^2 - \prod_{i=3}^{n}\cos\left(\frac{z_i}{\sqrt{i-2}}\right)$
		T_2	$f_1(x) = \frac{1}{2}(x_1 + x_2), f_2(x) = q(x)\left(1 - \left(\frac{x_1 + x_2}{2 \cdot q(x)}\right)^2\right), q(x) = 21 + e - 20\exp(-0.2\sqrt{\frac{1}{n-2}\sum_{i=3}^{n} x_i^2}) - \exp\left(\frac{1}{n-2}\sum_{i=3}^{n}\cos(2\pi x_i)\right)$

TABLE SII
MULTI-OBJECTIVE COMPLICATED TWO-TASK BENCHMARK PROBLEMS.

Problem	sim	Task No.	Task
CPLX1	-0.0091	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - x_1^{0.5\left(1.0 + \frac{3(j-2)}{n-2}\right)}\right)^2, f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - x_1^{0.5\left(1.0 + \frac{3(j-2)}{n-2}\right)}\right)^2,$ where $J_1 = \{j \mid j$ is odd and $2 \le j \le n\}$ and $J_2 = \{j \mid j$ is even and $2 \le j \le n\}$
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2, f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ where J_1 and J_2 are the same as T_1.
CPLX2	0.399	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - x_1^{0.5\left(1.0 + \frac{3(j-2)}{n-2}\right)}\right)^2, f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - x_1^{0.5\left(1.0 + \frac{3(j-2)}{n-2}\right)}\right)^2,$ where J_1 and J_2 are the same as T_1.
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(4y_j^2 - \cos\left(8y_j\pi\right) + 1.0\right), f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(4y_j^2 - \cos\left(8y_j\pi\right) + 1.0\right),$ where J_1 and J_2 are the same as CPLX1 and $y_j = x_j - x_1^{0.5\left(1.0 + \frac{3(j-2)}{n-2}\right)}, j = 2, \ldots, n.$
CPLX3	0.442	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2, f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ where J_1 and J_2 are the same as CPLX1.
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - 0.8x_1\cos\left(\frac{6\pi x_1 + \frac{j\pi}{n}}{3}\right)\right)^2, f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - 0.8x_1\sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ where J_1 and J_2 are the same as CPLX1 .
CPLX4	1	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2, f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ where J_1 and J_2 are the same as CPLX1.
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2, f_2 = 1 - x_1^2 + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ where J_1 and J_2 are the same as those of CPLX1
CPLX5	0.1319	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - 0.8x_1\cos\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2, f_2 = 1 - \sqrt{x_1} + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - 0.8x_1\sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ where J_1 and J_2 are the same as those of CPLX1
		T_2	$f_1 = \cos(0.5x_1\pi)\cos(0.5x_2\pi) + \frac{2}{\lvert J_1 \rvert}\sum_{j \in J_1}\left(x_j - 2x_2\sin\left(2\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ $f_2 = \cos(0.5x_1\pi)\sin(0.5x_2\pi) + \frac{2}{\lvert J_2 \rvert}\sum_{j \in J_2}\left(x_j - 2x_2\sin\left(2\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ $f_3 = \sin(0.5x_1\pi) + \frac{2}{\lvert J_3 \rvert}\sum_{j \in J_3}\left(x_j - 2x_2\sin\left(2\pi x_1 + \frac{j\pi}{n}\right)\right)^2,$ $J_1 = \{j \mid 3 \le j \le n,$ and $j - 1$ is a multiplication of $3\}$, $J_2 = \{j \mid 3 \le j \le n,$ and $j - 2$ is a multiplication of $3\}$, $J_3 = \{j \mid 3 \le j \le n,$ and j is a multiplication of $3\}$

TABLE SIII
MULTI-OBJECTIVE COMPLEATED TWO-TASK BENCHMARK PROBLEMS.

Problem	sim	Task No.	Task
CPLX6	0.3448	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left(x_j - 0.8x_1\cos\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, $f_2 = 1-\sqrt{x_1} + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left(x_j - 0.8x_1\sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, where J_1 and J_2 are the same as those of CPLX1
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, $f_2 = 1-x_1^2 + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, where J_1 and J_2 are the same as those of CPLX1
CPLX7	0.8894	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left(x_j - 0.8x_1\cos\left(\frac{6\pi x_1+\frac{j\pi}{n}}{3}\right)\right)^2$, $f_2 = 1-\sqrt{x_1} + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left(x_j - 0.8x_1\sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, where J_1 and J_2 are the same as those of T_1 .
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left\{x_j - \left[0.3x_1^2\cos\left(24\pi x_1 + \frac{4j\pi}{n}\right) + 0.6x_1\right]\cos\left(6\pi x_1 + \frac{j\pi}{n}\right)\right\}^2$, $f_2 = 1-\sqrt{x_1} + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left\{x_j - \left[0.3x_1^2\cos\left(24\pi x_1 + \frac{4j\pi}{n}\right) + 0.6x_1\right]\sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right\}^2$, where J_1 and J_2 are the same as CPLX1.
CPLX8	0.1339	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left\{x_j - \left[0.3x_1^2\cos\left(24\pi x_1 + \frac{4j\pi}{n}\right) + 0.6x_1\right]\cos\left(6\pi x_1 + \frac{j\pi}{n}\right)\right\}^2$, $f_2 = 1-\sqrt{x_1} + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left\{x_j - \left[0.3x_1^2\cos\left(24\pi x_1 + \frac{4j\pi}{n}\right) + 0.6x_1\right]\sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right\}^2$, where J_1 and J_2 are the same as CPLX1.
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left(4y_j^2 - \cos\left(8y_j\pi\right) + 1.0\right)$, $f_2 = 1-\sqrt{x_1} + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left(4y_j^2 - \cos\left(8y_j\pi\right) + 1.0\right)$, $0.5\left(1.0+\frac{3(j-2)}{n-2}\right)$, $j = 2,\ldots,n$ where J_1 and J_2 are the same as those of T_1 and y_j=x_j-x_1 .
CPLX9	0.0904	T_1	$f_1 = \cos(0.5x_1\pi)\cos(0.5x_2\pi) + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left(x_j - 2x_2\sin\left(2\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, $f_2 = \cos(0.5x_1\pi)\sin(0.5x_2\pi) + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left(x_j - 2x_2\sin\left(2\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, $f_3 = \sin(0.5x_1\pi) + \frac{2}{\lvert J_3\rvert}\sum_{j\in J_3}\left(x_j - 2x_2\sin\left(2\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, $J_1 = \{j\lvert 3\le j\le n,$ and $j-1$ is a multiplication of $3\}$, $J_2 = \{j\lvert 3\le j\le n,$ and $j-2$ is a multiplication of $3\}$, $J_3 = \{j\lvert 3\le j\le n,$ and j is a multiplication of $3\}$
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, $f_2 = 1-x_1^2 + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left(x_j - \sin\left(6\pi x_1 + \frac{j\pi}{n}\right)\right)^2$, where J_1 and J_2 are the same as those of CPLX1
CPLX10	0.8023	T_1	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\sum_{j\in J_1}\left(4y_j^2 - \cos\left(8y_j\pi\right) + 1.0\right)$ $f_2 = 1-\sqrt{x_1} + \frac{2}{\lvert J_2\rvert}\sum_{j\in J_2}\left(4y_j^2 - \cos\left(8y_j\pi\right) + 1.0\right)$, $0.5\left(1.0+\frac{3(j-2)}{n-2}\right)$, $j = 2,\ldots,n$ where J_1 and J_2 are the same as those of T_1 and y_j=x_j-x_1 .
		T_2	$f_1 = x_1 + \frac{2}{\lvert J_1\rvert}\left(4\sum_{j\in J_1}y_j^2 - 2\prod_{j\in J_1}\cos\left(\frac{20y_j\pi}{\sqrt{j}}\right) + 2\right)$, $f_2 = 1-\sqrt{x_1} + \frac{2}{\lvert J_2\rvert}\left(4\sum_{j\in J_2}y_j^2 - 2\prod_{j\in J_2}\cos\left(\frac{20y_j\pi}{\sqrt{j}}\right) + 2\right)$, $0.5\left(1.0+\frac{3(j-2)}{n-2}\right)$, $j = 2,\ldots,n$ where J_1 and J_2 are the same as those of F1 and $y_j = x_j - x_1$

TABLE SIV
MULTI-OBJECTIVE MANY-TASK BENCHMARK PROBLEMS.

Problem	Task
MATP1	$f_1 = (1+g)\cos(0.5\pi x_1)$, $f_2 = (1+g)\sin(0.5\pi x_1)$, $g = \sum_{i=2}^{dim} x_i^2$
MATP2	$f_1 = x_1$, $f_2 = (1+g)\left(1-\left(\frac{f1}{(1+g)}\right)\right)$, $g = 9 * \frac{\sum_{i=2}^{dim}\lvert x_i\rvert}{dim}$
MATP3	$f_1 = x_1$, $f_2 = (1+g)\left(1-\left(\frac{f1}{(1+g)}\right)\right)$, $g = 100\sum_{i=2}^{dim-1}\left(x_i^2 - x_{i+1}^2\right) + \left(1-x_i^2\right)$
MATP4	$f_1 = (1+g)\cos(0.5\pi x_1)$, $f_2 = (1+g)\sin(0.5\pi x_1)$, $g = \sum_{i=2}^{dim} x_i^2 - 10\cos(2\pi x_i) + 10(\dim - 1)$
MATP5	$f_1 = x_1$, $f_2 = (1+g)(1-(\sqrt{\frac{f_1}{(1+g)}}))$, $g = -20\exp(-0.2\sqrt{\frac{1}{D}\sum_{i=1}^{D}x_i^2}),- \exp\left(\frac{1}{D}\sum_{i=1}^{D}\cos(2\pi x_i)\right) + 20 + e$
MATP6	$f_1 = (1+g)\cos(0.5\pi x_1)$, $f_2 = (1+g)\sin(0.5\pi x_1)$,$g = 1 + \frac{\sum_{i=2}^{dim}x_i^2}{4000} - \prod_{i=1}^{dim}\cos\left(\frac{x_i}{\sqrt{i}}\right)$