Comparative with IHDELS and IHSHADELS (and versions)

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1 Original version IHDELS-CEC2015

1.1 Comparison against MOS

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- MOS improve in 12 of 15 functions.
- IHDELS is not competitive.

2 IHDELS-CEC2015 vs IHDELS-Restart

2.1 Differences

- Changed the selection of LS method.

Table 1: IDELS-CEC2015 vs MOS

	1.2e5		6.00E+005		3.00E+006	
Function	MOS	IHDELS	MOS	IHDELS	MOS	IHDELS
F_1	2.99E+007	**1.29E+001**	1.38E+000	**1.81E-023**	**0.00E+000**	4.80E-029
F_2	2.59E+003	**1.77E+003**	1.77E+003	**1.27E+003**	**8.36E+002**	1.27E+003
F_3	**7.77E+000**	2.00E+001	**4.09E-011**	2.00E+001	**9.10E-013**	2.00E+001
F_4	3.58E+010	**1.77E+010**	2.46E+009	**2.24E+009**	**1.56E+008**	3.09E+008
F_5	**6.80E+006**	1.12E+007	**6.79E+006**	1.02E+007	**6.79E+006**	9.68E+006
F_6	**3.11E+005**	1.05E+006	1.39E+005	**1.04E+006**	**1.39E+005**	1.03E+006
F_7	3.28E+008	**2.86E+008**	8.07E+006	**6.90E+006**	**1.62E+004**	3.18E+004
F_8	3.72E+014	**1.74E+014**	8.56E+013	**1.70E+013**	8.08E+012	**1.36E+012**
F_9	**f4.32E+008**	7.34E+008	**3.89E+008**	7.24E+008	**3.87E+008**	7.12E+008
F_{10}	**1.24E+006**	9.39E+007	**1.18E+006**	9.35E+007	**1.18E+006**	9.19E+007
F_{11}	**2.78E+009**	7.15E+009	7.79E+008	**4.55E+008**	4.48E+007	**9.87E+006**
F_{12}	**1.02E+004**	1.82E+003	2.02E+003	**1.24E+003**	**2.46E+002**	5.16E+002
F_{13}	**7.34E+009**	1.20E+010	7.64E+008	**7.32E+008**	**3.30E+006**	4.02E+006
F_{14}	**4.46E+010**	6.81E+010	**1.24E+008**	1.53E+008	2.42E+007	**1.48E+007**
F_{15}	**1.43E+007**	5.95E+007	**6.25E+006**	1.72E+007	**2.38E+006**	3.13E+006

- Changed the restart, the original did not applied restart in many function, and never improve.

2.2 Comparison

- Improve in 10 of 15 functions.
- Improve specially in more difficult problems.

2.3 Comparison against MOS

- Now IHDELS$_{\text{restart}}$ improve in 7 of 15 functions.
- Improve specially in more difficult ones.
- In several functions: F11, F13 the improvement is several order of magnitud.

3 New proposal: IHDELS vs IHSHADELS

Table 2: Results IHDELS vs IHDELS_restart

Functions	Function	IHDELS	IHDELS$_restart$
Separable	F_1	**4.80e-29**	4.53e-24
	F_2	1.27e+03	**1.26e+03**
	F_3	**2.00e+01**	2.01e+01
Partially Separable	F_4	3.09e+08	**2.55e+08**
	F_5	**9.68e+06**	1.18e+07
	F_6	1.03e+06	1.03e+06
	F_7	3.18e+04	**5.83e+02**
Partially Separable II	F_8	**1.36e+12**	2.19e+12
	F_9	7.12e+08	**5.14e+08**
	F_{10}	9.19e+07	**9.16e+07**
	F_{11}	9.87e+06	**2.77e+06**
With overlapping	F_{12}	5.16e+02	**1.32e+02**
	F_{13}	4.02e+06	**6.29e+05**
	F_{14}	1.48e+07	**1.01e+07**
Non separable	F_{15}	3.13e+06	**1.35e+06**

Table 3: Results IHDELS_restart vs MOS

Grupo de Funciones	Función	Propuesta	MOS
Separable	F_1	4.53e-24	**0.00e+00**
	F_2	1.26e+03	**8.36e+02**
	F_3	2.01e+01	**9.10e-13**
Parcialmente Separable	F_4	2.55e+08	**1.56e+08**
	F_5	1.18e+07	**6.79e+06**
	F_6	1.03e+06	**1.39e+05**
	F_7	**5.83e+02**	1.62e+04
Partially Separable II	F_8	**2.19e+12**	8.08e+12
	F_9	5.14e+08	**3.87e+08**
	F_{10}	9.16e+07	**1.18e+06**
	F_{11}	**2.77e+06**	4.48e+07
With overlapping	F_{12}	**1.32e+02**	2.46e+02
	F_{13}	**6.29e+05**	3.30e+06
	F_{14}	**1.01e+07**	2.42e+07
Non separable	F_{15}	**1.35e+06**	2.38e+06