

Supplementary files

Table S1. Dataset for RTC silicon photovoltaic cell and the results for the current using BWOA

Measured RTC data		SDM-BWOA	DDM-BWOA	Error Values	
V [V]	I _m [A]	I _c [A]	I _c [A]	SDM	DDM
-0.2057	0.7640	0.764087703686289	0.763907924900087	$8.77036862894087 \times 10^{-05}$	$-9.20750999126030 \times 10^{-05}$
-0.1291	0.7620	0.762663086107012	0.762564305032765	0.000663086107012378	0.000564305032765167
-0.0588	0.7605	0.761355307147406	0.761330102118770	0.000855307147405671	0.000830102118770326
0.0057	0.7605	0.760153991056235	0.760194458176645	-0.000346008943765352	-0.000305541823354627
0.0646	0.7600	0.759055208976456	0.759151568371366	-0.000944791023543612	-0.000848431628633795
0.1185	0.7590	0.758042345371249	0.758181926912848	-0.000957654628750637	-0.000818073087151872
0.1678	0.7570	0.757091654151800	0.757256968621908	$9.1654151799680 \times 10^{-05}$	0.000256968621908271
0.2132	0.7570	0.756141365039090	0.756308725705275	-0.000858634960909654	-0.000691274294724709
0.2545	0.7555	0.755086873020116	0.755226721783036	-0.000413126979883716	-0.000273278216963768
0.2924	0.7540	0.753663878570242	0.753744255511693	-0.000336121429758363	-0.000255744488307008
0.3269	0.7505	0.751390966888911	0.751386067340965	0.000890966888911104	0.000886067340965191
0.3585	0.7465	0.747353851785036	0.747253362143312	0.000853851785036386	0.000753362143311676
0.3873	0.7385	0.740117222292567	0.739937812642467	0.00161722229256678	0.00143781264246667
0.4137	0.7280	0.727382225264810	0.727168406572573	-0.000617774735189869	-0.000831593427427446
0.4373	0.7065	0.706972651493744	0.706788976476825	0.000472651493744425	0.000288976476824465
0.4590	0.6755	0.675280151427688	0.675184281664695	-0.000219848572312054	-0.000315718335304749
0.4784	0.6320	0.630758272226471	0.630773702827327	-0.00124172777352871	-0.00122629717267342
0.4960	0.5730	0.571928358068966	0.572037012402298	-0.00107164193103415	-0.000962987597701526
0.5119	0.4990	0.499607018422965	0.499758563117576	0.000607018422965122	0.000758563117576383
0.5265	0.4130	0.413648791997119	0.413773362738465	0.000648791997119480	0.000773362738465344
0.5398	0.3165	0.317510109469288	0.317558299785278	0.00101010946928809	0.00105829978527772
0.5521	0.2120	0.212154939098163	0.212102027430469	0.000154939098162527	0.000102027430468693
0.5633	0.1035	0.102251311825317	0.102118377066160	-0.00124868817468334	-0.00138162293383995
0.5736	-0.0100	-0.00871754163612570	-0.00882931903970998	0.00128245836387430	0.00117068096029002
0.5833	-0.1230	-0.125507412722793	-0.125555848939070	-0.00250741272279320	-0.00255584893907049
0.5900	-0.2100	-0.208472326530722	-0.208322720916255	0.00152767346927754	0.00167727908374460

Table S2. Dataset for aSi silicon photovoltaic cell and the results for the current using BWOA

Measured aSi:H data		SDM -BWOA	DDM -BWOA	Error Values	
V [V]	I _c [A]	I _c [A]	I _c [A]	SDM	DDM
-0.01	0.0112831	0.0113639170777395	0.0113543640131099	$8.08170777394854 \times 10^{-05}$	$7.12640131098792 \times 10^{-05}$
0.00848	0.0112656	0.0113284369737074	0.0113204995286285	$6.28369737073666 \times 10^{-05}$	$5.48995286285305 \times 10^{-05}$
0.026955	0.0112425	0.0112929293836994	0.0112865571019497	$5.04293836994085 \times 10^{-05}$	$4.40571019497057 \times 10^{-05}$
0.045435	0.0112236	0.0112573662588710	0.0112524961088132	$3.37662588709813 \times 10^{-05}$	$2.88961088131829 \times 10^{-05}$
0.063915	0.0112024	0.0112217462698878	0.0112183121237316	$1.93462698878343 \times 10^{-05}$	$1.59121237316134 \times 10^{-05}$
0.08239	0.0111931	0.0111860655479016	0.0111839830059655	$-7.03445209844673 \times 10^{-06}$	$-9.11699403445543 \times 10^{-06}$
0.10087	0.0111547	0.0111502880256704	0.0111494938943344	$-4.41197432959548 \times 10^{-06}$	$-5.20610566559498 \times 10^{-06}$
0.11935	0.0111104	0.0111144026028242	0.0111148078141574	$4.00260282415986 \times 10^{-06}$	$4.40781415743906 \times 10^{-06}$
0.137825	0.011099	0.0110783933602251	0.0110798707977408	$-2.06066397749165 \times 10^{-05}$	$-1.91292022591587 \times 10^{-05}$
0.156305	0.0110782	0.0110422090155986	0.0110446518418724	$-3.59909844013552 \times 10^{-05}$	$-3.35481581276303 \times 10^{-05}$
0.174785	0.0110397	0.0110058199278824	0.0110091162075602	$-3.38800721176400 \times 10^{-05}$	$-3.05837924397638 \times 10^{-05}$
0.19326	0.011007	0.0109691873123277	0.0109731964262600	$-3.78126876722854 \times 10^{-05}$	$-3.38035737400318 \times 10^{-05}$
0.21175	0.0109816	0.0109322109202030	0.0109367798898797	$-4.93890797969958 \times 10^{-05}$	$-4.48201101203357 \times 10^{-05}$
0.2302	0.0109413	0.0108949268742292	0.0108999064716921	$-4.63731257707746 \times 10^{-05}$	$-4.13935283078634 \times 10^{-05}$
0.2487	0.0108962	0.0108570604318233	0.0108622844260555	$-3.91395681766521 \times 10^{-05}$	$-3.39155739444586 \times 10^{-05}$
0.26715	0.010861	0.0108187020930534	0.0108239809683603	$-4.22979069466256 \times 10^{-05}$	$-3.70190316396641 \times 10^{-05}$
0.28565	0.0108375	0.0107795020856175	0.0107846349086185	$-5.79979143824922 \times 10^{-05}$	$-5.28650913814814 \times 10^{-05}$
0.30415	0.0107773	0.0107393874707428	0.0107442051723617	$-3.79125292571617 \times 10^{-05}$	$-3.30948276383095 \times 10^{-05}$
0.3226	0.0107235	0.0106982535022866	0.0107025490038831	$-2.52464977133684 \times 10^{-05}$	$-2.09509961168735 \times 10^{-05}$
0.3411	0.0106896	0.0106556079884685	0.0106591567134376	$-3.39920115315483 \times 10^{-05}$	$-3.04432865623570 \times 10^{-05}$
0.35955	0.0106237	0.0106113493316985	0.0106139807656461	$-1.23506683014744 \times 10^{-05}$	$-9.71923435390439 \times 10^{-06}$
0.37805	0.0105959	0.0105648250102782	0.0105663058693081	$-3.10749897217792 \times 10^{-05}$	$-2.95941306919460 \times 10^{-05}$
0.3965	0.0105226	0.0105157775156068	0.0105159789629445	$-6.82248439320445 \times 10^{-06}$	$-6.62103705550976 \times 10^{-06}$
0.415	0.0104671	0.0104633086074013	0.0104620550683966	$-3.79139259873949 \times 10^{-06}$	$-5.04493160344809 \times 10^{-06}$
0.4335	0.0104073	0.0104067626851978	0.0104039388046724	$-5.37314802170549 \times 10^{-07}$	$-3.36119532757563 \times 10^{-06}$
0.45195	0.0103272	0.0103453423619186	0.0103409050703820	$1.81423619185616 \times 10^{-05}$	$1.37050703819894 \times 10^{-05}$
0.47045	0.0102575	0.0102775145388884	0.0102714300671013	$2.00145388884049 \times 10^{-05}$	$1.39300671012591 \times 10^{-05}$

0.4889	0.0101725	0.0102021654004108	0.0101945166243710	$2.96654004107912 \times 10^{-05}$	$2.20166243710164 \times 10^{-05}$
0.5074	0.0100598	0.0101170471506706	0.0101080209275142	$5.72471506706269 \times 10^{-05}$	$4.82209275141695 \times 10^{-05}$
0.52585	0.009967	0.0100203509748415	0.0100101521469287	$5.33509748415033 \times 10^{-05}$	$4.31521469286857 \times 10^{-05}$
0.54435	0.0098534	0.0099087337458596	0.009897740471745	$5.53337458596669 \times 10^{-05}$	$4.43404717449976 \times 10^{-05}$
0.56285	0.0097021	0.0097789425523616	0.0097677017183262	$7.68425523616154 \times 10^{-05}$	$6.56017183262737 \times 10^{-05}$
0.5813	0.0095669	0.0096270924456899	0.0096161014615041	$6.01924456899491 \times 10^{-05}$	$4.92014615041288 \times 10^{-05}$
0.5998	0.0093838	0.0094470103124487	0.0094370410925342	$6.32103124487120 \times 10^{-05}$	$5.32410925342119 \times 10^{-05}$
0.61825	0.0092011	0.0092330702072393	0.0092247433380352	$3.19702072393430 \times 10^{-05}$	$2.36433380352667 \times 10^{-05}$
0.63675	0.0089748	0.0089759131359037	0.0089699816562542	$1.11313590373148 \times 10^{-06}$	$-4.81834374573865 \times 10^{-06}$
0.6552	0.0086853	0.0086668150794210	0.0086640124268935	$-1.84849205789872 \times 10^{-05}$	$-2.12875731064877 \times 10^{-05}$
0.6737	0.0083376	0.0082915344233485	0.0082922931452415	$-4.60655766514728 \times 10^{-05}$	$-4.53068547584257 \times 10^{-05}$
0.69215	0.007911	0.0078365990999339	0.0078410068157045	$-7.44009000660465 \times 10^{-05}$	$-6.99931842954252 \times 10^{-05}$
0.71065	0.0073725	0.0072802844837173	0.0072880300536298	$-9.22155162826855 \times 10^{-05}$	$-8.44699463701066 \times 10^{-05}$
0.72915	0.006665	0.0065998101880698	0.0066104339613021	$-6.51898119301492 \times 10^{-05}$	$-5.45660386978234 \times 10^{-05}$
0.7476	0.005787	0.0057680779161056	0.0057802035770437	$-1.89220838943578 \times 10^{-05}$	$-6.79642295621421 \times 10^{-06}$
0.7661	0.0047014	0.0047440293303676	0.0047556279359075	$4.26293303676904 \times 10^{-05}$	$5.42279359075160 \times 10^{-05}$
0.78455	0.0034034	0.0034881147448844	0.0034959598435628	$8.47147448844584 \times 10^{-05}$	$9.25598435628531 \times 10^{-05}$
0.80305	0.0018769	0.0019375107343568	0.0019368173051715	$6.06107343568895 \times 10^{-05}$	$5.99173051715352 \times 10^{-05}$
0.8215	9.58×10^{-05}	$3.1502399936 \times 10^{-05}$	$1.6859656728 \times 10^{-05}$	$-6.42950000631984 \times 10^{-05}$	$-7.89377432711714 \times 10^{-05}$

Table S3. Dataset for PWP201 photovoltaic panel and the results for the current using BWOA

Measured PWP201 data		SDM-BWOA	DDM-BWOA	Error Values	
V [V]	I _c [A]	I _c [A]	I _c [A]	SDM	DDM
0.1248	1.0315	1.02911916122193	1.02908463756044	-0.00238083877807149	-0.00241536243955531
1.8093	1.0300	1.02738107306964	1.02736058353566	-0.00261892693036425	-0.00263941646434329
3.3511	1.0260	1.02574179684753	1.02573388667919	-0.000258203152474268	-0.000266113320808836
4.7622	1.0220	1.02410715472446	1.02411026126003	0.00210715472445577	0.00211026126003477
6.0538	1.0180	1.02229180451599	1.02230407685751	0.00429180451599209	0.00430407685750933
7.2364	1.0155	1.01993068084600	1.01994982441441	0.00443068084599552	0.00444982441440955
8.3189	1.0140	1.01636310566225	1.01638623772660	0.00236310566224973	0.00238623772659796

9.3097	1.0100	1.01049615133223	1.01051982999519	0.000496151332229911	0.000519829995186516
10.2163	1.0035	1.00062896976236	1.00064952115116	-0.00287103023764201	-0.00285047884884193
11.0449	0.9880	0.984548378560180	0.984562532134642	-0.00345162143982014	-0.00343746786535804
11.8018	0.9630	0.959521676190664	0.959527403822914	-0.00347832380933644	-0.00347259617708584
12.4929	0.9255	0.922838818136119	0.922836058146630	-0.00266118186388109	-0.00266394185337049
13.1231	0.8725	0.872599662897686	0.872590496291441	$9.96628976861480 \times 10^{-05}$	$9.0496291441311 \times 10^{-05}$
13.6983	0.8075	0.807274263734078	0.807262628613154	-0.000225736265921594	-0.000237371386845986
14.2221	0.7265	0.728336478022576	0.728326630653704	0.00183647802257558	0.00182663065370348
14.6995	0.6345	0.637138000002873	0.637133767661910	0.00263800000287295	0.00263376766191048
15.1346	0.5345	0.536213063092143	0.536216923910961	0.00171306309214347	0.00171692391096068
15.5311	0.4275	0.429511324816342	0.429523400871342	0.00201132481634203	0.00202340087134156
15.8929	0.3185	0.318774482672914	0.318793802338219	0.000274482672914300	0.000293802338218963
16.2229	0.2085	0.207389506586033	0.207413273234648	-0.00111049341396682	-0.00108672676535179
16.5241	0.1010	0.0961671717438964	0.0961924877533427	-0.00483282825610357	-0.00480751224665735
16.7987	-0.0080	-0.00832538604429356	-0.00830486620292781	-0.000325386044293559	-0.000304866202927807
17.0499	-0.1110	-0.110936482485436	-0.110923557950866	$6.3517514563807 \times 10^{-05}$	$7.6442049134387 \times 10^{-05}$
17.2793	-0.2090	-0.209247265477190	-0.209245406427170	-0.000247265477189534	-0.000245406427169720
17.4885	-0.3030	-0.300863586255949	-0.300876884740028	0.00213641374405144	0.00212311525997161

Table S4. Dataset for PVM 752 GaAs photovoltaic panel and the results for the current using BWOA.

Measured PVM data		SDM-BWOA	DDM-BWOA	Error Values	
V [V]	I _c [A]	I _c [A]	I _c [A]	SDM	DDM
-0.1659	0.1001	0.100230939995650	0.100115085813528	0.000130939995650434	$1.50858135282428 \times 10^{-05}$
-0.1281	0.1	0.100168878592889	0.100075376218311	0.000168878592889138	$7.53762183107604 \times 10^{-05}$
-0.0888	0.0999	0.100104350124348	0.100033767288574	0.000204350124347760	0.000133767288573713
-0.049	0.0999	0.100038890664094	0.0999911440462642	0.000138890664094171	$9.11440462641605 \times 10^{-05}$
-0.0102	0.0999	0.0999750759085191	0.0999490966639285	$7.50759085191149 \times 10^{-05}$	$4.90966639285356 \times 10^{-05}$
0.0275	0.0998	0.0999131789558785	0.0999077382492599	0.000113178955878451	0.000107738249259901
0.0695	0.0999	0.0998439924397019	0.0998606743345032	$-5.60075602981242 \times 10^{-05}$	$-3.93256654968033 \times 10^{-05}$

0.1061	0.0998	0.0997839045499621	0.0998189232636929	$-1.60954500378896 \times 10^{-05}$	$1.89232636928771 \times 10^{-05}$
0.146	0.0998	0.0997182802374666	0.0997721675924786	$-8.17197625333638 \times 10^{-05}$	$-2.78324075214526 \times 10^{-05}$
0.1828	0.0997	0.0996578626587503	0.0997278136205772	$-4.21373412497067 \times 10^{-05}$	$2.78136205772023 \times 10^{-05}$
0.223	0.0997	0.0995917428519070	0.0996774952220992	-0.000108257148092997	$-2.25047779008336 \times 10^{-05}$
0.26	0.0996	0.0995309915146817	0.0996292536649850	$-6.90084853182532 \times 10^{-05}$	$2.92536649850461 \times 10^{-05}$
0.3001	0.0997	0.0994649142186488	0.0995740792852066	-0.000235085781351188	-0.000125920714793448
0.3406	0.0996	0.0993983701074584	0.0995150063598814	-0.000201629892541605	$-8.49936401186024 \times 10^{-05}$
0.3789	0.0995	0.0993353843506576	0.0994550841484594	-0.000164615649342420	$-4.49158515405806 \times 10^{-05}$
0.4168	0.0994	0.0992729063417915	0.0993909371814196	-0.000127093658208483	$-9.06281858037428 \times 10^{-06}$
0.4583	0.0994	0.0992039267542620	0.0993135385001014	-0.000196073245738046	$-8.64614998985908 \times 10^{-05}$
0.4949	0.0993	0.0991422222130243	0.0992375246404533	-0.000157777786975677	$-6.24753595467320 \times 10^{-05}$
0.537	0.0993	0.0990681258112317	0.0991373473776350	-0.000231874188768341	-0.000162652622365048
0.5753	0.0992	0.0989937261002853	0.0990290308827122	-0.000206273899714726	-0.000170969117287811
0.6123	0.099	0.0989057174373760	0.0988984113307809	$-9.42825626240179 \times 10^{-05}$	-0.000101588669219152
0.6546	0.0988	0.0987544392619073	0.0986875527844903	$-4.55607380927259 \times 10^{-05}$	-0.000112447215509751
0.6918	0.0983	0.0985100515774959	0.0983862164552676	0.000210051577495915	$8.62164552675598 \times 10^{-05}$
0.7318	0.0977	0.0979466132350273	0.0977689978128640	0.000246613235027338	$6.89978128639995 \times 10^{-05}$
0.7702	0.0963	0.0966964456684183	0.0964972186092311	0.000396445668418260	0.000197218609231123
0.8053	0.0937	0.0941729855342935	0.0940029070744328	0.000472985534293535	0.000302907074432757
0.8329	0.09	0.0904096451643265	0.0903003656801820	0.000409645164326497	0.000300365680182005
0.855	0.0855	0.0855846639580423	0.0855370975142949	$8.46639580423247 \times 10^{-05}$	$3.70975142949120 \times 10^{-05}$
0.8738	0.0799	0.0798632627244195	0.0798632368657914	$-3.67372755804840 \times 10^{-05}$	$-3.67631342086117 \times 10^{-05}$
0.8887	0.0743	0.0740588181765370	0.0740835020648640	-0.000241181823462971	-0.000216497935136034
0.9016	0.0683	0.0681668907920787	0.0682020829129945	-0.000133109207921325	$-9.79170870054752 \times 10^{-05}$
0.9141	0.0618	0.0615205424051200	0.0615514885254365	-0.000279457594880052	-0.000248511474563513
0.9248	0.0555	0.0552015704219524	0.0552210664031353	-0.000298429578047640	-0.000278933596864699
0.9344	0.0493	0.0490545458603126	0.0490597047354093	-0.000245454139687379	-0.000240295264590670
0.9445	0.0422	0.0421655298507326	0.0421559359737882	$-3.44701492674474 \times 10^{-05}$	$-4.40640262118139 \times 10^{-05}$
0.9533	0.0357	0.0357014483869612	0.0356771249685220	$1.44838696119337 \times 10^{-06}$	$-2.28750314780479 \times 10^{-05}$

0.9618	0.0291	0.0291116957956494	0.0290755411376624	$1.16957956494412 \times 10^{-05}$	$-2.44588623375674 \times 10^{-05}$
0.9702	0.0222	0.0223802477200165	0.0223412825788558	0.000180247720016454	0.000141282578855814
0.9778	0.0157	0.0160675658009639	0.0160340059157772	0.000367565800963858	0.000334005915777223
0.9852	0.0092	0.00966098771501825	0.00963899593966827	0.000460987715018249	0.000438995939668271
0.9926	0.0026	0.00290915920131453	0.00290247016698557	0.000309159201314529	0.000302470166985569
0.9999	-0.004	-0.00410795100586316	-0.00409542728608017	-0.000107951005863156	$-9.54272860801721 \times 10^{-05}$
1.0046	-0.0085	-0.00846840689550342	-0.00842564258270891	$3.15931044965814 \times 10^{-05}$	$7.43574172910946 \times 10^{-05}$
1.0089	-0.0124	-0.0130041330093888	-0.0129496713770302	-0.000604133009388769	-0.000549671377030181

Table S5. RMSE and computing time function of the number of the search agents and iterations using the BWOA.

a) RTC photovoltaic cell

Model	Search Agents	Iterations	RMSE	Computing time [s]
SDM	15	500	0.09716191950777	1.742201
	25		0.01710505622307	1.872167
	30		0.00164396452169	1.512047
	50		0.00383259539179	1.515693
	75		0.004933770771100	1.498199
	100		0.001085117771710	1.647471
	125		0.00114832069950	1.488976
	150		0.008349955037951	1.453551
	175		0.00114937303421	1.587463
	200		0.000988469415022	1.517393
	225		0.001451798170829	1.584988
	250		0.00098756008969	1.635081
	15	1500	0.09715942423576	1.605835
	25		0.017105056155616	1.541983
	30		0.001643964522	1.447000
	50		0.003817897900727	1.775546
	75		0.0043504430413010	1.833663
	100		0.0009860218779	1.773923

	125		0.0009860218778916	1.806350
	150		0.008349951699929	1.794384
	175		0.0009860218778915	2.889780
	200		0.00098602187789	1.795901
	225		0.0009860218778917	1.957148
	250		0.000986021877892	1.965546
DDM	15	500	0.01050572689558	1.431802
	25		0.13222009702754	1.425383
	30		0.09139467303992	1.341051
	50		0.00959812531089	1.424014
	75		0.030305437424735	1.545112
	100		0.001215287285674	1.480591
	125		0.00110769738637	1.582938
	150		0.001513787604398	1.547388
	175		0.00509963887265	1.652692
	200		0.001260544656922	1.745343
	225		0.001220487313764	1.837532
	250		0.00115930926499	1.661523
	15	1500	0.04833894044266	1.434656
	25		0.132220096878317	1.460464
	30		0.091394644822	1.541869
	50		0.008521587026783	1.603826
	75		0.0113808967215160	1.628334
	100		0.0009849647498	1.693591
	125		0.0009860318306789	1.783168
	150		0.001293480722908	1.911392
	175		0.0009773823187984	2.205030
	200		0.00098287079716	1.997286
	225		0.0009880226016394	2.082286

	250		0.000977382318798	2.166910
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b) aSi photovoltaic cell

Model	Search Agents	Iterations	RMSE	Computing time [s]
SDM	15	500	0.00025850864029	1.819460
	25		0.000182379079984	1.835827
	30		0.00021557192555	1.408758
	50		0.00023123583711	1.505987
	75		0.000046385658906	1.503013
	100		0.00026687570460	1.663363
	125		0.00004630053566	1.488417
	150		0.00011166644178	1.462640
	175		0.00004613786472	1.543784
	200		0.00004612322475	1.687007
	225		0.00004613786473	1.557683
	250		0.00004636648112	2.484998
	15	1500	0.00025850864029	1.893793
	25		0.000172193746961	1.502069
	30		0.0002143436749	1.491199
	50		0.00010014204529	1.621136
	75		0.00004638329888	1.639022
	100		0.0002380918118	1.718489
	125		0.00004612466446	1.712930
	150		0.0000461378647219	1.766652
	175		0.00004613786472193	1.952037
	200		0.00004612321932	1.959808
	225		0.0000461378647219	2.392527
	250		0.0000461378647	2.016107
DDM	15	500	0.00074069315866	1.831961
	25		0.000304097062639	1.358007

	30		0.00022479061417	1.555787
	50		0.00008745923777	1.520240
	75		0.000052354219962	1.649419
	100		0.00006756649492	1.552289
	125		0.00033719968990	1.564335
	150		0.00004570188924	1.544579
	175		0.00005720866346	1.998468
	200		0.00004735659174	1.768161
	225		0.00004346987976	1.607626
	250		0.00004815331029	1.841301
	15	1500	0.00072898681904	1.462421
	25		0.000304097062170	1.433821
	30		0.0002243444565	1.499318
	50		0.00008740888654	1.777893
	75		0.00005235386756	1.667859
	100		0.0000440434692	1.774815
	125		0.00007745262769	1.881914
	150		0.0000433353089633	1.914678
	175		0.00004351547557564	2.050738
	200		0.00004293936164	2.140468
	225		0.0000409439377149	2.749709
	250		0.0000425861269	2.338393

c) PWP201 photovoltaic panel

Model	Search Agents	Iterations	RMSE	Computing time [s]
SDM	15	500	0.01699313072150	1.340747
	25		0.0053696967663	1.421998
	30		0.0456048371678	1.862874
	50		0.002632530780382	1.401712
	75		0.0042192459144	1.410425

	100		0.00406906000523	1.463479
	125		0.00246561074616	1.664897
	150		0.002490160954981	1.537866
	175		0.00268791540250	1.651075
	200		0.00242529963805	1.500461
	225		0.00242507486821	1.730137
	250		0.0024250748682	1.616498
	15	1500	0.016879683606338	1.406177
	25		0.0053696920848	1.561392
	30		0.043037538	1.467279
	50		0.0024577586136	1.483281
	75		0.002440632411948	1.556448
	100		0.0024250748685	1.661467
	125		0.0024250748681	1.700580
	150		0.00242507486810	1.741827
	175		0.002425074868095	2.300761
	200		0.00242507486810	1.953224
	225		0.0024250748681	1.958053
	250		0.00242507486810	2.003670
DDM	15	500	0.07364868968259	1.401682
	25		0.0294308632298	1.339136
	30		0.0028658793845	1.436284
	50		0.007829179028347	1.378182
	75		0.0025623981284	1.445102
	100		0.00387315866781	1.466780
	125		0.00254171658648	1.483492
	150		0.002809853049893	1.548378
	175		0.00242698332942	1.683659
	200		0.00254725138487	1.581480

	225		0.00245104309887	1.845615
	250		0.0024393543586	1.735792
	15	1500	0.073648689682590	1.387619
	25		0.0294308628930	1.609740
	30		0.002865871	1.570120
	50		0.0077987381348	1.586099
	75		0.002562347940795	1.701031
	100		0.0025454866892	1.693371
	125		0.0024250748681	1.992434
	150		0.00247654830089	1.858437
	175		0.002425074993961	1.930152
	200		0.00254721835439	2.046289
	225		0.0024250748787	2.072408
	250		0.00242600685477	2.163120

d) PVM 752 GaAs thin-film photovoltaic panel

Model	Search Agents	Iterations	RMSE	Computing time [s]
SDM	15	500	0.0005299395750	1.392556
	25		0.011962711499594	1.348896
	30		0.00023219793246	1.356738
	50		0.0003986408971	1.410046
	75		0.00074827652981	1.486375
	100		0.00023215854451	1.457388
	125		0.00044820133311	1.478273
	150		0.00078312325797	1.653348
	175		0.00023029317714	1.647252
	200		0.00115031315804	1.635350
	225		0.00044502635824	1.922878
	250		0.0002440245217	1.644363

	15	1500	0.000529934354780	1.438112
	25		0.0118335482048	1.447748
	30		0.000232197932458	1.670031
	50		0.00039824604045	1.465178
	75		0.00074593635085	1.568069
	100		0.00022780382937	1.729144
	125		0.000745936350852	1.699583
	150		0.000253646300816	1.866094
	175		0.0002284383372276	2.018141
	200		0.00022902129613	1.906894
	225		0.0002278040888803	1.985836
	250		0.000227803829	2.054059
DDM	15	500	0.0084209901683	1.597923
	25		0.584247804122671	1.410347
	30		0.32211186412250	1.423493
	50		0.0005206635988	1.413818
	75		0.00026274390940	1.500997
	100		0.00017114543330	1.496219
	125		0.00032861296562	1.532872
	150		0.00018827406761	1.558172
	175		0.00023627754003	1.595936
	200		0.00024209072486	1.549792
	225		0.00023366716673	1.624788
	250		0.000227815294741870	1.735792
	15	1500	0.007900424195347	1.476325
	25		0.5842474806957	1.453151
	30		0.322111719208788	1.492318
	50		0.00026883031360	1.544111
	75		0.00023643579371	1.659773

	100		0.00016861021820	1.745712
	125		0.000232477046877	1.886568
	150		0.000175947504432	1.967023
	175		0.0017503422578100	2.073735
	200		0.00022655351795	2.603572
	225		0.0001677947841902	2.284357
	250		0.000177819360	2.351128

Best results are highlighted in bold