In this document, we provide some numerical data of our simulations in the paper “Joint Unmanned Aerial Vehicl Location and Beamforming and Caching Optimization for Cache-Enabled Multi-Unmanned-Aerial-Vehicle Networks”.

Firstly, the numerical results of three figures in the paper is shown as follows.



The latency performance versus UAV capacity coefficient.

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| --- | --- | --- | --- |
| Capacity Coefficient | Algorithm1 | Algorithm2 | Algorithm3 |
| 0.7 | 2196.39742127205 | 2494.74037292197 | 2834.40420323494 |
| 0.8 | 1431.64003779032 | 1657.86690771889 | 1918.79210931869 |
| 0.9 | 728.844906167354 | 920.865132806530 | 997.421751840051 |
| 1 | 50.7068871683938 | 137.893562336960 | 83.1483758416963 |



The latency performance versus Zipf parameter α.

|  |  |  |  |
| --- | --- | --- | --- |
| Zipf Parameter | Algorithm1 | Algorithm2 | Algorithm3 |
| 0.3 | 1698.17902138083 | 1870.37396478317 | 2110.60338431480 |
| 0.4 | 1550.02821730903 | 1692.38863904721 | 2139.95994995658 |
| 0.5 | 1412.45278989740 | 1556.96126065595 | 2157.43994414626 |
| 0.6 | 1279.56494242184 | 1395.62393512883 | 2205.71790172967 |
| 0.7 | 1132.75544497061 | 1264.96656801977 | 2184.52795532741 |
| 0.8 | 1021.37535292850 | 1115.68631573398 | 2207.77543733668 |
| 0.9 | 950.887176373098 | 1004.60072355175 | 2294.37636842187 |
| 1 | 807.151976047366 | 873.547549617849 | 2277.89953116017 |



The latency performance versus UAV height.

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| --- | --- | --- | --- |
| Height(m) | Algorithm1 | Algorithm2 | Algorithm3 |
| 100 | 2919.67544484557 | 2932.07153087553 | 4464.28404161200 |
| 200 | 2893.29155085458 | 2937.96406583759 | 4466.99903006700 |
| 300 | 2882.87419066034 | 2932.37371483732 | 4455.54737379311 |
| 400 | 2928.35609393444 | 2982.81059323671 | 4515.09524387399 |
| 500 | 2909.40495330879 | 2923.21126225552 | 4504.20303321789 |

We also provide optimized variables w, v, z in one of the simulations.

There are 16×3×9 elements in each w.

**Optimized w of Algorithm 1**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 1 | 0.1249+0.083852i | 0.13408+0.13772i | 0.14736+0.1821i |
| 2 | 0.024945-0.0028016i | 0.11027+0.10853i | 0.99153+0.61964i |
| 3 | 0.11255+0.072486i | -0.026931-0.0367i | 0.10749+0.76993i |
| 4 | 0.12242+0.086593i | -0.12275-0.14284i | 0.33426+0.42109i |
| 5 | -0.033567-0.059209i | -0.16315-0.18789i | 0.037959+0.43899i |
| 6 | 0.065818+0.033164i | -0.024372-0.03837i | 0.92241+0.48878i |
| 7 | 0.071125+0.034339i | 0.11204+0.11191i | 0.37314+0.21683i |
| 8 | -0.023344-0.051979i | 0.16572+0.16894i | 0.98916+0.83291i |
| 9 | -0.11715-0.13309i | 0.052708+0.048806i | 0.54346+0.50154i |
| 10 | -0.039377-0.060147i | -0.0091909-0.019424i | 0.56332+0.10273i |
| 11 | -0.039403-0.064495i | 0.077919+0.07204i | 0.1879+0.36436i |
| 12 | -0.00842-0.028426i | -0.07177-0.088563i | 0.2155+0.8208i |
| 13 | 0.15404+0.1141i | 0.033755+0.028624i | 0.48531+0.12284i |
| 14 | -0.16065-0.17033i | 0.038012+0.031686i | 0.2195+0.64936i |
| 15 | 0.00011962-0.02837i | -0.08563-0.099297i | 0.93687+0.73662i |
| 16 | 0.023723-0.0091351i | -0.070893-0.088175i | 0.27762+0.71066i |

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|  |  |  |  |
| 1 | 0.9531+0.10533i | 0.038185+0.081096i | -0.075212-0.064046i |
| 2 | 0.81493+0.9586i | 0.05712+0.10328i | -0.01393-0.0025443i |
| 3 | 0.3496+0.42369i | 0.071783+0.12692i | -0.02856-0.013487i |
| 4 | 0.021606+0.56011i | 0.12203+0.18132i | -0.17411-0.14591i |
| 5 | 0.34101+0.098783i | -0.056652-0.066845i | -0.14188-0.11879i |
| 6 | 0.3844+0.48312i | -0.011531+0.012419i | -0.054774-0.038582i |
| 7 | 0.093289+0.15362i | -0.036739-0.041285i | 0.20212+0.19706i |
| 8 | 0.96925+0.30847i | -0.044693-0.047409i | -0.066317-0.055712i |
| 9 | 0.19004+0.13092i | -0.077374-0.081965i | 0.13531+0.13843i |
| 10 | 0.16462+0.34352i | -0.0025527+0.019373i | -0.14755-0.13014i |
| 11 | 0.50703+0.66306i | -0.030068-0.012747i | 0.075076+0.078484i |
| 12 | 0.50824+0.5162i | -0.051856-0.050763i | 0.15545+0.16083i |
| 13 | 0.051478+0.79667i | -0.040799-0.028996i | 0.038982+0.03775i |
| 14 | 0.36701+0.57659i | -0.019758-0.00094901i | 0.028268+0.040803i |
| 15 | 0.5848+0.066874i | 0.021855+0.044641i | -0.18069-0.16322i |
| 16 | 0.99475+0.24848i | 0.053029+0.10548i | -0.062586-0.043535i |

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| 1 | 0.53129+0.7549i | -0.03951-0.023665i | 0.025137+0.09802i |
| 2 | 0.62119+0.32622i | -0.049213-0.034851i | -0.10052-0.13041i |
| 3 | 0.28034+0.52198i | -0.14133-0.10948i | -0.022372+0.016116i |
| 4 | 0.19776+0.64558i | -0.006665+0.013775i | 0.079135+0.16473i |
| 5 | 0.40839+0.51124i | 0.051682+0.063962i | -0.015043+0.017662i |
| 6 | 0.3626+0.6621i | -0.083323-0.056797i | 0.10822+0.20518i |
| 7 | 0.1619+0.23131i | 0.059001+0.065898i | -0.048199-0.030507i |
| 8 | 0.89352+0.98257i | -0.064027-0.043743i | 0.11275+0.20544i |
| 9 | 0.44048+0.085919i | 0.0030127+0.015444i | 0.061651+0.13087i |
| 10 | 0.67031+0.41268i | -0.1078-0.081399i | 0.031459+0.10758i |
| 11 | 0.21043+0.98528i | 0.13173+0.12182i | -0.12437-0.14512i |
| 12 | 0.47115+0.48526i | -0.10988-0.080197i | -0.069974-0.073599i |
| 13 | 0.049914+0.61187i | 0.022154+0.037303i | 0.0011217+0.065076i |
| 14 | 0.49593+0.01122i | 0.045427+0.049938i | -0.040687-0.0090515i |
| 15 | 0.26972+0.76855i | 0.14555+0.14838i | -0.11956-0.14501i |
| 16 | 0.68417+0.74156i | 0.047555+0.058295i | -0.050962-0.036759i |

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| 1 | -0.056223-0.067218i | 0.65333+0.72368i | -0.049645-0.04512i |
| 2 | 0.12753+0.086572i | 0.75413+0.43238i | -0.048036-0.049349i |
| 3 | 0.039972+0.014456i | 0.28+0.26145i | -0.092199-0.10865i |
| 4 | 0.024835+0.00026379i | 0.60305+0.18941i | -0.0029737+0.019095i |
| 5 | 0.042694+0.01891i | 0.88878+0.21448i | 0.0059187+0.028628i |
| 6 | -0.2093-0.19276i | 0.64323+0.49489i | -0.10123-0.11661i |
| 7 | 0.18851+0.13789i | 0.78606+0.033001i | 0.10167+0.15927i |
| 8 | 0.099192+0.061442i | 0.49114+0.37262i | -0.035268-0.036278i |
| 9 | -0.028236-0.044758i | 0.40346+0.35668i | -0.14777-0.18117i |
| 10 | -0.027466-0.042936i | 0.87744+0.27471i | 0.0031715+0.022247i |
| 11 | -0.034723-0.04917i | 0.70818+0.2644i | 0.070191+0.12207i |
| 12 | -0.090107-0.086771i | 0.82649+0.74451i | -0.14748-0.18146i |
| 13 | -0.0018399-0.019542i | 0.01067+0.13168i | 0.17747+0.25914i |
| 14 | 0.31182+0.24412i | 0.095557+0.80308i | -0.032611-0.023145i |
| 15 | -0.20022-0.18891i | 0.54328+0.3044i | -0.039817-0.039174i |
| 16 | -0.20138-0.18795i | 0.85622+0.34285i | 0.0051458+0.029468i |

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| 1 | 0.076509+0.5185i | 0.037553+0.040747i | -0.039724-0.05524i |
| 2 | 0.16652+0.45394i | -0.06229-0.07841i | 0.20935+0.18503i |
| 3 | 0.74771+0.1795i | 0.10913+0.12572i | 0.24809+0.22361i |
| 4 | 0.33457+0.8474i | -0.070767-0.092585i | 0.043122+0.034571i |
| 5 | 0.30505+0.046426i | -0.021555-0.028221i | 0.012132-0.0085913i |
| 6 | 0.81888+0.5236i | 0.019709+0.016576i | -0.23384-0.22543i |
| 7 | 0.98205+0.2327i | 0.0066413+0.0037822i | -0.11059-0.11556i |
| 8 | 0.96897+0.90327i | -0.026674-0.037582i | 0.029786+0.020161i |
| 9 | 0.57662+0.54126i | 0.12624+0.14958i | -0.15721-0.16398i |
| 10 | 0.23348+0.098685i | -0.050078-0.06938i | -0.10085-0.11616i |
| 11 | 0.2921+0.85708i | 0.04304+0.044516i | 0.061646+0.03916i |
| 12 | 0.67376+0.042738i | 0.064016+0.070334i | -0.0504-0.063157i |
| 13 | 0.57374+0.14204i | -0.12037-0.14918i | -0.11499-0.11713i |
| 14 | 0.1997+0.2175i | 0.022087+0.023645i | 0.078387+0.062971i |
| 15 | 0.9582+0.77746i | 0.015051+0.011187i | 0.11105+0.09839i |
| 16 | 0.33615+0.35761i | 0.0041064+0.0057935i | 0.0091217+0.0048187i |

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|  |  |  |  |
| 1 | 0.085192+0.11098i | 0.16851+0.094925i | 0.15359+0.16964i |
| 2 | -0.10144-0.099132i | 0.96401+0.85091i | 0.035444+0.048075i |
| 3 | -0.12578-0.12726i | 0.34827+0.5222i | -0.092723-0.08319i |
| 4 | 0.01938+0.04077i | 0.59849+0.016366i | -0.093555-0.080002i |
| 5 | 0.26521+0.30225i | 0.73139+0.12918i | 0.014366+0.032793i |
| 6 | -0.096567-0.089971i | 0.87082+0.59317i | 0.094886+0.11168i |
| 7 | 0.14966+0.17857i | 0.3334+0.72179i | -0.039937-0.028775i |
| 8 | -0.0060621+0.0054023i | 0.46304+0.037025i | -0.15201-0.14085i |
| 9 | -0.14348-0.14791i | 0.16689+0.17617i | 0.065448+0.078551i |
| 10 | 0.10094+0.12242i | 0.46639+0.23244i | -0.010249+0.0074617i |
| 11 | 0.0138+0.024229i | 0.45637+0.71501i | -0.016792-0.0064309i |
| 12 | 0.048697+0.070782i | 0.12782+0.77059i | -0.020622-0.017209i |
| 13 | -0.078903-0.070182i | 0.63993+0.58938i | -0.12676-0.1208i |
| 14 | -0.19975-0.20823i | 0.89649+0.87294i | -0.047337-0.034959i |
| 15 | -0.056332-0.043646i | 0.42743+0.45399i | -0.085113-0.073526i |
| 16 | 0.061239+0.087163i | 0.17585+0.98393i | -0.034282-0.020977i |

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|  |  |  |  |
| 1 | 0.21031+0.76997i | -0.0021694+0.013582i | -0.060523-0.075042i |
| 2 | 0.60811+0.7557i | -0.033576-0.010648i | 0.11298+0.12811i |
| 3 | 0.46572+0.99239i | -0.12993-0.079258i | 0.070316+0.080299i |
| 4 | 0.6167+0.20307i | 0.014041+0.0195i | -0.048725-0.061235i |
| 5 | 0.20309+0.37542i | 0.06339+0.055204i | 0.049374+0.04945i |
| 6 | 0.6776+0.70867i | 0.042892+0.049864i | 0.041956+0.051322i |
| 7 | 0.017315+0.1635i | -0.16239-0.094412i | -0.044635-0.056866i |
| 8 | 0.22661+0.32396i | 0.11162+0.088918i | -0.12965-0.15882i |
| 9 | 0.91446+0.80901i | -0.074462-0.045474i | 0.15887+0.1887i |
| 10 | 0.76843+0.21896i | 0.05383+0.046202i | -0.064197-0.083441i |
| 11 | 0.53331+0.32839i | 0.20598+0.16267i | -0.096716-0.1207i |
| 12 | 0.06838+0.462i | 0.16969+0.12771i | 0.0095918+0.0086897i |
| 13 | 0.19958+0.35233i | 0.076946+0.059367i | 0.0019033-0.010616i |
| 14 | 0.012018+0.073539i | 0.1501+0.12395i | -0.03772-0.051116i |
| 15 | 0.96657+0.50519i | -0.076318-0.044183i | -0.10298-0.12987i |
| 16 | 0.8322+0.2742i | 0.053934+0.052326i | -0.11438-0.14949i |

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|  |  |  |  |
| 1 | 0.034968+0.012872i | 0.07728+0.063859i | 0.22067+0.52325i |
| 2 | 0.088871+0.063267i | -0.14479-0.21561i | 0.35466+0.052769i |
| 3 | 0.20546+0.16965i | 0.033462+0.016928i | 0.63773+0.96001i |
| 4 | 0.12793+0.10364i | 0.22281+0.24537i | 0.74975+0.67221i |
| 5 | -0.053386-0.08234i | 0.09713+0.092819i | 0.49242+0.065467i |
| 6 | 0.090876+0.063243i | 0.066431+0.047867i | 0.61739+0.97913i |
| 7 | -0.16391-0.18275i | 0.059733+0.03993i | 0.31945+0.29484i |
| 8 | -0.035209-0.054402i | -0.14671-0.21506i | 0.3025+0.94991i |
| 9 | 0.15301+0.12448i | -0.16212-0.22562i | 0.14179+0.17342i |
| 10 | -0.1013-0.11883i | -0.0052991-0.03339i | 0.84434+0.00090447i |
| 11 | 0.19024+0.15993i | -0.08288-0.14228i | 0.28815+0.87845i |
| 12 | 0.08876+0.067002i | -0.13504-0.1934i | 0.90883+0.85054i |
| 13 | -0.065382-0.081141i | -0.029946-0.064232i | 0.11321+0.33641i |
| 14 | 0.022321+0.0042993i | 0.047048+0.023151i | 0.61386+0.09833i |
| 15 | -0.27042-0.26615i | 0.21924+0.24669i | 0.2839+0.62812i |
| 16 | 0.026486+0.01i | -0.098749-0.1568i | 0.50813+0.40042i |

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| 1 | -0.087706-0.096791i | -0.043141-0.023808i | 0.26138+0.46893i |
| 2 | -0.091236-0.10624i | 0.15761+0.17196i | 0.89591+0.15417i |
| 3 | 0.12073+0.069446i | -0.11861-0.093464i | 0.45971+0.21513i |
| 4 | 0.021905-0.0084177i | -0.057365-0.037747i | 0.23202+0.64517i |
| 5 | 0.046941+0.017486i | -0.045536-0.026795i | 0.19594+0.60614i |
| 6 | 0.19899+0.14519i | 0.052411+0.07021i | 0.84969+0.18234i |
| 7 | 0.082516+0.056259i | -0.015529-0.0013857i | 0.74161+0.86769i |
| 8 | 0.039906+0.0040122i | 0.057818+0.071402i | 0.66221+0.52772i |
| 9 | 0.072252+0.04193i | -0.0074773+0.018571i | 0.10709+0.97454i |
| 10 | 0.088221+0.056834i | 0.037231+0.054573i | 0.83617+0.28548i |
| 11 | 0.10363+0.064844i | -0.18524-0.16803i | 0.45491+0.94908i |
| 12 | 0.085725+0.058919i | -0.10345-0.084554i | 0.65063+0.6076i |
| 13 | -0.081366-0.098385i | -0.17231-0.15193i | 0.90442+0.77649i |
| 14 | 0.03991+0.0079432i | -0.1883-0.16509i | 0.11071+0.063482i |
| 15 | 0.18979+0.14631i | 0.079503+0.095158i | 0.60383+0.59116i |
| 16 | 0.13177+0.093981i | 0.013016+0.030814i | 0.016382+0.89976i |

**Optimized w of Algorithm 2**

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| --- | --- | --- | --- |
|  |  |  |  |
| 1 | 0.044977+0.079475i | 0.068154+0.092735i | 0.14735+0.18209i |
| 2 | 0.0077156+0.062147i | 0.0547+0.09062i | 0.99146+0.6196i |
| 3 | 0.03782+0.071462i | 0.042859+0.070566i | 0.10748+0.76987i |
| 4 | 0.035777+0.065782i | 0.026647+0.069298i | 0.33423+0.42106i |
| 5 | -0.021362+0.051146i | 0.021632+0.063454i | 0.037955+0.43896i |
| 6 | 0.023186+0.061671i | 0.047649+0.087715i | 0.92234+0.48875i |
| 7 | 0.022834+0.07138i | 0.058339+0.086179i | 0.37312+0.21682i |
| 8 | -0.0055441+0.06896i | 0.069195+0.09656i | 0.98909+0.83285i |
| 9 | -0.055529+0.038765i | 0.052365+0.080303i | 0.54342+0.50151i |
| 10 | -0.019311+0.050329i | 0.034724+0.068164i | 0.56328+0.10272i |
| 11 | -0.0044955+0.065228i | 0.047877+0.067133i | 0.18789+0.36433i |
| 12 | -0.010512+0.049095i | 0.03643+0.0689i | 0.21548+0.82074i |
| 13 | 0.044209+0.071327i | 0.052482+0.078386i | 0.48527+0.12283i |
| 14 | -0.049946+0.046325i | 0.044066+0.066382i | 0.21948+0.64931i |
| 15 | -0.0034185+0.068097i | 0.024072+0.065938i | 0.93681+0.73657i |
| 16 | -0.0045838+0.059164i | 0.032368+0.074376i | 0.2776+0.71062i |

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|  |  |  |  |
| 1 | 0.95304+0.10533i | 0.032641+0.021792i | 0.08739+0.075836i |
| 2 | 0.81488+0.95854i | 0.040084+0.014496i | 0.082821+0.074782i |
| 3 | 0.34957+0.42366i | 0.037947+0.052973i | 0.086058+0.075705i |
| 4 | 0.021604+0.56008i | 0.038633+0.04696i | 0.088178+0.07167i |
| 5 | 0.34099+0.098776i | 0.022134-0.023301i | 0.0953+0.078805i |
| 6 | 0.38437+0.48308i | 0.030388-0.0053892i | 0.094516+0.081768i |
| 7 | 0.093283+0.15361i | 0.025769-0.022639i | 0.10723+0.11058i |
| 8 | 0.96919+0.30845i | 0.031937-0.020585i | 0.094883+0.083355i |
| 9 | 0.19003+0.13091i | 0.023493-0.023552i | 0.08899+0.089422i |
| 10 | 0.16461+0.3435i | 0.026872-0.0026892i | 0.089097+0.073075i |
| 11 | 0.507+0.66302i | 0.03297+0.017226i | 0.095505+0.092133i |
| 12 | 0.5082+0.51617i | 0.032873+0.0049384i | 0.082565+0.084893i |
| 13 | 0.051474+0.79661i | 0.032704+0.0088437i | 0.093391+0.087682i |
| 14 | 0.36699+0.57656i | 0.02901+0.013972i | 0.098346+0.090544i |
| 15 | 0.58476+0.066869i | 0.023214-0.010184i | 0.085701+0.065476i |
| 16 | 0.99468+0.24847i | 0.044478+0.036805i | 0.096519+0.085589i |

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| 1 | 0.53125+0.75485i | 0.08187+0.05251i | 0.046512-0.017271i |
| 2 | 0.62115+0.32619i | 0.095634+0.052602i | 0.042258-0.043583i |
| 3 | 0.28032+0.52194i | 0.056239+0.021804i | 0.043235-0.033684i |
| 4 | 0.19775+0.64553i | 0.090398+0.066099i | 0.047368-0.014134i |
| 5 | 0.40836+0.5112i | 0.081805+0.073019i | 0.051489-0.029104i |
| 6 | 0.36258+0.66205i | 0.077956+0.039598i | 0.051358-0.014173i |
| 7 | 0.16189+0.23129i | 0.087687+0.073232i | 0.05181-0.035848i |
| 8 | 0.89346+0.9825i | 0.089759+0.051824i | 0.045984-0.0047688i |
| 9 | 0.44045+0.085913i | 0.087671+0.068161i | 0.038243-0.016791i |
| 10 | 0.67026+0.41265i | 0.073512+0.031872i | 0.043734-0.017835i |
| 11 | 0.21041+0.98522i | 0.090591+0.10478i | 0.047788-0.044833i |
| 12 | 0.47111+0.48523i | 0.074497+0.043501i | 0.040614-0.041028i |
| 13 | 0.04991+0.61183i | 0.086762+0.078447i | 0.051293-0.019999i |
| 14 | 0.4959+0.011219i | 0.077304+0.07713i | 0.05265-0.031346i |
| 15 | 0.2697+0.7685i | 0.089705+0.087267i | 0.045987-0.043908i |
| 16 | 0.68413+0.74151i | 0.098579+0.084189i | 0.049494-0.031821i |

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| 1 | 0.17071+0.17554i | 0.65329+0.72363i | 0.064864+0.081723i |
| 2 | 0.19141+0.1613i | 0.75407+0.43235i | 0.061143+0.07307i |
| 3 | 0.18587+0.16883i | 0.27998+0.26143i | 0.065106+0.068036i |
| 4 | 0.17777+0.16447i | 0.60301+0.1894i | 0.076866+0.104i |
| 5 | 0.1868+0.16808i | 0.88872+0.21446i | 0.079107+0.10645i |
| 6 | 0.11608+0.14776i | 0.64319+0.49486i | 0.071077+0.075717i |
| 7 | 0.23336+0.1849i | 0.78601+0.032998i | 0.075819+0.11762i |
| 8 | 0.20897+0.18105i | 0.49111+0.3726i | 0.067703+0.084493i |
| 9 | 0.17229+0.17258i | 0.40343+0.35665i | 0.060785+0.056984i |
| 10 | 0.16144+0.16044i | 0.87738+0.27469i | 0.070073+0.095929i |
| 11 | 0.1666+0.16388i | 0.70813+0.26438i | 0.067672+0.10374i |
| 12 | 0.11842+0.13459i | 0.82643+0.74446i | 0.056122+0.049915i |
| 13 | 0.17677+0.17101i | 0.010668+0.13167i | 0.068528+0.11982i |
| 14 | 0.21504+0.15227i | 0.095549+0.80303i | 0.068877+0.083454i |
| 15 | 0.13529+0.1707i | 0.54325+0.30438i | 0.06122+0.071907i |
| 16 | 0.1398+0.17299i | 0.85616+0.34282i | 0.071196+0.098139i |

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| 1 | 0.076504+0.51846i | 0.05512+0.070509i | 0.11591+0.10488i |
| 2 | 0.16651+0.45391i | 0.033846+0.054238i | 0.13541+0.10334i |
| 3 | 0.74766+0.17949i | 0.069987+0.0815i | 0.14382+0.11017i |
| 4 | 0.33454+0.84734i | 0.03408+0.051467i | 0.12282+0.10503i |
| 5 | 0.30503+0.046423i | 0.044116+0.060259i | 0.12475+0.10896i |
| 6 | 0.81882+0.52356i | 0.049741+0.06619i | 0.087377+0.09945i |
| 7 | 0.98198+0.23269i | 0.050573+0.068059i | 0.10923+0.10691i |
| 8 | 0.9689+0.90321i | 0.042239+0.059842i | 0.11473+0.098704i |
| 9 | 0.57658+0.54122i | 0.072205+0.085429i | 0.081784+0.085351i |
| 10 | 0.23347+0.098679i | 0.026248+0.040405i | 0.10316+0.097616i |
| 11 | 0.29208+0.85703i | 0.060235+0.072827i | 0.12869+0.10851i |
| 12 | 0.67372+0.042735i | 0.066052+0.079089i | 0.099301+0.093234i |
| 13 | 0.5737+0.14203i | 0.019517+0.033839i | 0.10102+0.10026i |
| 14 | 0.19969+0.21748i | 0.052579+0.064845i | 0.12574+0.10792i |
| 15 | 0.95813+0.77741i | 0.043241+0.059685i | 0.11323+0.093568i |
| 16 | 0.33613+0.35758i | 0.057295+0.076004i | 0.11429+0.10007i |

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| 1 | 0.14094+0.12329i | 0.1685+0.094917i | 0.059047+0.13693i |
| 2 | 0.11561+0.081479i | 0.96395+0.85085i | 0.053864+0.10176i |
| 3 | 0.11802+0.080533i | 0.34824+0.52216i | 0.05616+0.077046i |
| 4 | 0.13923+0.11783i | 0.59845+0.016363i | 0.06315+0.09404i |
| 5 | 0.13976+0.13931i | 0.73134+0.12917i | 0.066145+0.11705i |
| 6 | 0.11069+0.079369i | 0.87076+0.59313i | 0.063033+0.12599i |
| 7 | 0.1398+0.12712i | 0.33337+0.72174i | 0.063707+0.10308i |
| 8 | 0.12682+0.097913i | 0.46301+0.037021i | 0.058192+0.073638i |
| 9 | 0.12046+0.079733i | 0.16687+0.17616i | 0.049785+0.10153i |
| 10 | 0.12306+0.10845i | 0.46636+0.23242i | 0.058942+0.10531i |
| 11 | 0.1142+0.090631i | 0.45634+0.71496i | 0.05914+0.10198i |
| 12 | 0.12109+0.10393i | 0.12781+0.77053i | 0.050372+0.082221i |
| 13 | 0.13102+0.097434i | 0.63989+0.58934i | 0.059002+0.080879i |
| 14 | 0.10167+0.059906i | 0.89643+0.87288i | 0.063234+0.09548i |
| 15 | 0.13604+0.10236i | 0.4274+0.45396i | 0.057879+0.077185i |
| 16 | 0.14322+0.12198i | 0.17583+0.98386i | 0.064603+0.10576i |

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| 1 | 0.21029+0.76992i | -0.044774-0.082772i | 0.2237-0.0085999i |
| 2 | 0.60807+0.75565i | -0.085469-0.12904i | 0.25198-0.079881i |
| 3 | 0.46569+0.99233i | -0.065533-0.094887i | 0.26343-0.02133i |
| 4 | 0.61666+0.20306i | -0.047321-0.086888i | 0.24803+0.00065717i |
| 5 | 0.20308+0.37539i | -0.027242-0.062978i | 0.27407-0.050003i |
| 6 | 0.67756+0.70862i | -0.031519-0.076073i | 0.29337+0.007448i |
| 7 | 0.017315+0.16349i | -0.085518-0.12247i | 0.24378-0.011685i |
| 8 | 0.22659+0.32394i | -0.047953-0.086754i | 0.19962+0.026901i |
| 9 | 0.9144+0.80896i | -0.071847-0.10479i | 0.28599-0.040814i |
| 10 | 0.76838+0.21894i | -0.042798-0.078791i | 0.21939-0.0084068i |
| 11 | 0.53328+0.32837i | 0.0088788-0.021582i | 0.19554-0.019032i |
| 12 | 0.068376+0.46197i | -0.001306-0.03498i | 0.20936-0.033422i |
| 13 | 0.19957+0.35231i | -0.039191-0.068947i | 0.21364-0.1028i |
| 14 | 0.012017+0.073535i | 0.0058797-0.02729i | 0.22222-0.021167i |
| 15 | 0.96651+0.50516i | -0.070975-0.1096i | 0.18598+0.027479i |
| 16 | 0.83215+0.27418i | -0.046725-0.088171i | 0.18845-0.031987i |

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| 1 | 0.045265+0.11412i | 0.076779+0.22319i | 0.22066+0.52321i |
| 2 | 0.043237+0.09963i | 0.07029+0.28448i | 0.35464+0.052763i |
| 3 | 0.077498+0.12395i | 0.067791+0.19134i | 0.63769+0.95995i |
| 4 | 0.071604+0.12547i | 0.085865+0.22023i | 0.7497+0.67216i |
| 5 | 0.017353+0.096924i | 0.072319+0.20448i | 0.49239+0.06546i |
| 6 | 0.047127+0.098973i | 0.077831+0.2423i | 0.61735+0.97907i |
| 7 | 0.002141+0.098526i | 0.07968+0.23584i | 0.31943+0.29482i |
| 8 | 0.026792+0.10785i | 0.069399+0.2643i | 0.30248+0.94984i |
| 9 | 0.064433+0.11877i | 0.056215+0.22468i | 0.14178+0.17341i |
| 10 | 0.0043705+0.084513i | 0.064783+0.21827i | 0.84428+0.00090191i |
| 11 | 0.075842+0.11992i | 0.062178+0.20056i | 0.28813+0.87839i |
| 12 | 0.040691+0.091463i | 0.063035+0.21892i | 0.90877+0.85048i |
| 13 | 0.017311+0.098248i | 0.069488+0.2123i | 0.1132+0.33638i |
| 14 | 0.025943+0.085153i | 0.070944+0.19417i | 0.61382+0.098322i |
| 15 | -0.026485+0.083252i | 0.079909+0.21351i | 0.28388+0.62807i |
| 16 | 0.034594+0.10617i | 0.072346+0.26153i | 0.5081+0.40039i |

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| 1 | -0.20524-0.083007i | 0.10249+0.14724i | 0.26136+0.4689i |
| 2 | -0.1859-0.073044i | 0.089102+0.21013i | 0.89585+0.15416i |
| 3 | -0.10318-0.023067i | 0.090758+0.11103i | 0.45968+0.21511i |
| 4 | -0.1436-0.04693i | 0.1163+0.15946i | 0.232+0.64513i |
| 5 | -0.14462-0.048999i | 0.085908+0.12846i | 0.19593+0.6061i |
| 6 | -0.065944-0.0096602i | 0.089327+0.17249i | 0.84964+0.18233i |
| 7 | -0.14935-0.052903i | 0.088215+0.13799i | 0.74156+0.86763i |
| 8 | -0.15249-0.049735i | 0.080433+0.16656i | 0.66217+0.52768i |
| 9 | -0.14264-0.049032i | 0.094406+0.15463i | 0.10708+0.97447i |
| 10 | -0.11934-0.037774i | 0.091268+0.16361i | 0.83612+0.28547i |
| 11 | -0.11238-0.032722i | 0.095267+0.094348i | 0.45489+0.94902i |
| 12 | -0.11169-0.03852i | 0.076588+0.10961i | 0.65059+0.60756i |
| 13 | -0.19301-0.073927i | 0.099488+0.10386i | 0.90436+0.77644i |
| 14 | -0.1202-0.03805i | 0.1107+0.10882i | 0.1107+0.063478i |
| 15 | -0.11076-0.031229i | 0.08714+0.1642i | 0.60379+0.59112i |
| 16 | -0.1274-0.041955i | 0.083869+0.15975i | 0.016382+0.8997i |

**Optimized w of Algorithm 3**

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| 1 | 0.128+0.077874i | 0.10226+0.2135i | 0.14736+0.1821i |
| 2 | 0.048122+0.021408i | 0.10281+0.21416i | 0.99152+0.61964i |
| 3 | 0.095841+0.054244i | 0.053357+0.10848i | 0.10749+0.76992i |
| 4 | 0.1191+0.073603i | 0.03686+0.072026i | 0.33425+0.42108i |
| 5 | 0.00045573-0.013273i | 0.019435+0.032643i | 0.037958+0.43899i |
| 6 | 0.082357+0.047431i | 0.065797+0.13216i | 0.9224+0.48878i |
| 7 | 0.094443+0.053907i | 0.09407+0.19773i | 0.37314+0.21683i |
| 8 | 0.020984-0.0010515i | 0.11273+0.23589i | 0.98916+0.83291i |
| 9 | -0.066504-0.060801i | 0.078981+0.16234i | 0.54345+0.50154i |
| 10 | 0.0025007-0.010764i | 0.058802+0.12025i | 0.56331+0.10273i |
| 11 | -0.011217-0.024835i | 0.078498+0.16341i | 0.1879+0.36436i |
| 12 | -0.0018929-0.013657i | 0.044867+0.088531i | 0.21549+0.8208i |
| 13 | 0.1439+0.09162i | 0.068688+0.14156i | 0.4853+0.12284i |
| 14 | -0.092085-0.081171i | 0.067753+0.14123i | 0.2195+0.64936i |
| 15 | 0.046225+0.018914i | 0.04098+0.083423i | 0.93687+0.73662i |
| 16 | 0.035109+0.012193i | 0.055219+0.11144i | 0.27762+0.71066i |

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| 1 | 0.9531+0.10533i | 0.23182-0.062562i | -0.019718-0.0082614i |
| 2 | 0.81493+0.9586i | 0.2686-0.077631i | 0.014995+0.018409i |
| 3 | 0.3496+0.42369i | 0.23708-0.064739i | 0.017017+0.019636i |
| 4 | 0.021606+0.56011i | 0.29197-0.088657i | -0.12087-0.084823i |
| 5 | 0.34101+0.098782i | 0.14519-0.041849i | -0.086254-0.058445i |
| 6 | 0.3844+0.48312i | 0.21051-0.055608i | 0.0052885+0.010979i |
| 7 | 0.093289+0.15362i | 0.17035-0.052426i | 0.18881+0.1524i |
| 8 | 0.96925+0.30847i | 0.18269-0.05524i | -0.047472-0.028103i |
| 9 | 0.19004+0.13092i | 0.14371-0.034488i | 0.16866+0.13579i |
| 10 | 0.16462+0.34352i | 0.19071-0.051895i | -0.10792-0.074448i |
| 11 | 0.50703+0.66306i | 0.17196-0.047784i | 0.069873+0.061338i |
| 12 | 0.50824+0.5162i | 0.16417-0.045327i | 0.18761+0.14914i |
| 13 | 0.051478+0.79666i | 0.171-0.044397i | 0.020709+0.023935i |
| 14 | 0.36701+0.57659i | 0.178-0.04872i | 0.058523+0.051943i |
| 15 | 0.58479+0.066873i | 0.20141-0.057216i | -0.15166-0.1094i |
| 16 | 0.99475+0.24848i | 0.26906-0.074033i | -0.031853-0.016366i |

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| 1 | 0.53129+0.7549i | 0.038839+0.041491i | 0.071525-0.14279i |
| 2 | 0.62119+0.32622i | 0.035849+0.038952i | -0.023081+0.067808i |
| 3 | 0.28034+0.52198i | -0.017522-0.012739i | 0.036023-0.064322i |
| 4 | 0.19776+0.64558i | 0.050021+0.052907i | 0.085811-0.1768i |
| 5 | 0.40838+0.51124i | 0.065581+0.066421i | 0.034429-0.058587i |
| 6 | 0.3626+0.6621i | 0.018015+0.020884i | 0.11312-0.2423i |
| 7 | 0.1619+0.23131i | 0.081281+0.081385i | 0.017592-0.020566i |
| 8 | 0.89352+0.98256i | 0.023358+0.027238i | 0.098683-0.20989i |
| 9 | 0.44047+0.085919i | 0.051133+0.053112i | 0.086592-0.18554i |
| 10 | 0.67031+0.41268i | -0.0046161+0.00022872i | 0.062375-0.12098i |
| 11 | 0.21043+0.98528i | 0.098602+0.098006i | -0.032441+0.096464i |
| 12 | 0.47114+0.48526i | -0.0070731-0.0014952i | 0.0090662-0.0061557i |
| 13 | 0.049913+0.61187i | 0.043873+0.047058i | 0.040941-0.070217i |
| 14 | 0.49593+0.01122i | 0.059208+0.060306i | 0.025869-0.036869i |
| 15 | 0.26972+0.76855i | 0.12185+0.11891i | -0.040105+0.113i |
| 16 | 0.68417+0.74156i | 0.075694+0.076593i | 0.010991-0.0037316i |

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| 1 | -0.16798-0.15055i | 0.65333+0.72368i | 0.030306+0.041593i |
| 2 | 0.028874+0.0019332i | 0.75412+0.43238i | 0.0047599+0.015032i |
| 3 | -0.1099-0.10771i | 0.28+0.26145i | -0.02818-0.019412i |
| 4 | -0.088634-0.089717i | 0.60305+0.18941i | 0.04578+0.06031i |
| 5 | -0.072148-0.077811i | 0.88878+0.21448i | 0.064116+0.079167i |
| 6 | -0.28736-0.23908i | 0.64323+0.49489i | -0.019091-0.009309i |
| 7 | 0.099921+0.052707i | 0.78606+0.033001i | 0.16494+0.18238i |
| 8 | -0.0065184-0.028413i | 0.49114+0.37262i | -0.0020508+0.0092055i |
| 9 | -0.17627-0.15781i | 0.40346+0.35667i | -0.062756-0.056084i |
| 10 | -0.1324-0.12185i | 0.87744+0.27471i | 0.047187+0.061278i |
| 11 | -0.17079-0.15374i | 0.70818+0.2644i | 0.12205+0.13783i |
| 12 | -0.221-0.18771i | 0.82649+0.74451i | -0.060289-0.055033i |
| 13 | -0.1015-0.099209i | 0.01067+0.13168i | 0.20594+0.22523i |
| 14 | 0.19171+0.12751i | 0.095556+0.80308i | 0.034499+0.04606i |
| 15 | -0.28166-0.23675i | 0.54328+0.3044i | -0.013379-0.0043711i |
| 16 | -0.31937-0.26748i | 0.85621+0.34284i | 0.058407+0.072424i |

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|  |  |  |  |
| 1 | 0.076508+0.5185i | 0.048414+0.054592i | 0.052756+0.080666i |
| 2 | 0.16652+0.45394i | 0.0022009+0.00090439i | 0.14547+0.25382i |
| 3 | 0.74771+0.1795i | 0.072184+0.082273i | 0.16774+0.2952i |
| 4 | 0.33457+0.8474i | -0.0079405-0.010927i | 0.080121+0.13149i |
| 5 | 0.30505+0.046425i | 0.009804+0.0098128i | 0.068143+0.10781i |
| 6 | 0.81887+0.52359i | 0.037749+0.042172i | -0.02374-0.05853i |
| 7 | 0.98204+0.2327i | 0.033182+0.036914i | 0.01994+0.019412i |
| 8 | 0.96897+0.90327i | 0.012928+0.013352i | 0.067788+0.10943i |
| 9 | 0.57662+0.54125i | 0.084348+0.096387i | 0.00048041-0.011527i |
| 10 | 0.23348+0.098684i | -0.0041686-0.0062929i | 0.012783+0.0069883i |
| 11 | 0.2921+0.85708i | 0.036183+0.040435i | 0.081657+0.13312i |
| 12 | 0.67376+0.042738i | 0.04556+0.051196i | 0.045062+0.069739i |
| 13 | 0.57374+0.14204i | -0.045931-0.054776i | 0.0053509-0.0068669i |
| 14 | 0.1997+0.2175i | 0.025899+0.028549i | 0.096676+0.16271i |
| 15 | 0.95819+0.77746i | 0.03976+0.044748i | 0.090896+0.15313i |
| 16 | 0.33615+0.3576i | 0.030384+0.033529i | 0.06611+0.10623i |

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| 1 | 0.13453+0.10192i | 0.16851+0.094924i | 0.016569+0.17862i |
| 2 | -0.018556-0.0064301i | 0.96401+0.8509i | -0.0091572+0.013583i |
| 3 | -0.052544-0.027898i | 0.34826+0.5222i | -0.030555-0.12359i |
| 4 | 0.076201+0.062546i | 0.59848+0.016366i | -0.041455-0.17206i |
| 5 | 0.25113+0.18308i | 0.73139+0.12918i | -0.017636-0.025355i |
| 6 | -0.009096+0.00048481i | 0.87081+0.59317i | 0.0061117+0.10978i |
| 7 | 0.18961+0.13975i | 0.3334+0.72178i | -0.027729-0.088298i |
| 8 | 0.063403+0.051458i | 0.46304+0.037025i | -0.053322-0.24554i |
| 9 | -0.064394-0.037029i | 0.16689+0.17617i | 0.0081231+0.10565i |
| 10 | 0.1348+0.10055i | 0.46639+0.23244i | -0.023651-0.065423i |
| 11 | 0.051422+0.042433i | 0.45637+0.71501i | -0.025367-0.078873i |
| 12 | 0.056566+0.048203i | 0.12782+0.77058i | -0.01-0.007384i |
| 13 | 0.0052767+0.012001i | 0.63993+0.58938i | -0.053392-0.24036i |
| 14 | -0.11-0.06989i | 0.89648+0.87293i | -0.024938-0.083199i |
| 15 | 0.034546+0.031526i | 0.42743+0.45399i | -0.041149-0.1792i |
| 16 | 0.093171+0.07381i | 0.17584+0.98392i | -0.029235-0.097211i |

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|  |  |  |  |
| 1 | 0.21031+0.76997i | -0.024556-0.035357i | -0.069579+0.10997i |
| 2 | 0.60811+0.7557i | -0.010168-0.015551i | 0.029531-0.094441i |
| 3 | 0.46572+0.99239i | 0.036506+0.045228i | 0.017663-0.051568i |
| 4 | 0.6167+0.20307i | -0.021283-0.030779i | -0.092594+0.15173i |
| 5 | 0.20309+0.37541i | -0.037023-0.051704i | -0.02454+0.010136i |
| 6 | 0.6776+0.70867i | -0.040808-0.058257i | 0.0030331-0.018182i |
| 7 | 0.017315+0.1635i | 0.040593+0.04948i | -0.080516+0.12678i |
| 8 | 0.22661+0.32396i | -0.062384-0.084066i | -0.14638+0.25715i |
| 9 | 0.91446+0.80901i | 0.010381+0.011994i | 0.10161-0.20715i |
| 10 | 0.76843+0.21896i | -0.033447-0.046093i | -0.10152+0.16719i |
| 11 | 0.53331+0.32839i | -0.094571-0.12765i | -0.12697+0.2077i |
| 12 | 0.06838+0.462i | -0.076168-0.10347i | -0.0033221-0.019067i |
| 13 | 0.19958+0.35233i | -0.029726-0.041392i | -0.086698+0.10513i |
| 14 | 0.012017+0.073539i | -0.070876-0.096832i | -0.06981+0.099645i |
| 15 | 0.96657+0.50519i | 0.003225+0.002129i | -0.13827+0.23784i |
| 16 | 0.8322+0.2742i | -0.041624-0.057924i | -0.14267+0.226i |

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| 1 | 0.044485+0.045602i | 0.010471+0.0093765i | 0.22067+0.52325i |
| 2 | 0.062126+0.076545i | -0.05391-0.21245i | 0.35466+0.052768i |
| 3 | 0.11391+0.15161i | -0.0040597-0.03915i | 0.63773+0.96001i |
| 4 | 0.091434+0.11654i | 0.04285+0.1163i | 0.74975+0.6722i |
| 5 | -0.018025-0.049326i | 0.0084547+0.0027299i | 0.49242+0.065466i |
| 6 | 0.068253+0.086564i | 0.0036776-0.013099i | 0.61739+0.97913i |
| 7 | -0.058015-0.1126i | 0.0044369-0.012181i | 0.31945+0.29484i |
| 8 | 0.0035945-0.017434i | -0.056643-0.21985i | 0.3025+0.9499i |
| 9 | 0.087871+0.11202i | -0.054839-0.21209i | 0.14179+0.17342i |
| 10 | -0.037128-0.076754i | -0.018368-0.088313i | 0.84434+0.00090443i |
| 11 | 0.10456+0.13811i | -0.042326-0.16965i | 0.28815+0.87845i |
| 12 | 0.045097+0.049871i | -0.057716-0.22408i | 0.90883+0.85053i |
| 13 | -0.0105-0.038003i | -0.033738-0.14314i | 0.11321+0.33641i |
| 14 | 0.019677+0.01233i | -0.0076323-0.054264i | 0.61386+0.09833i |
| 15 | -0.10911-0.18963i | 0.05324+0.15676i | 0.2839+0.62812i |
| 16 | 0.026425+0.017811i | -0.044141-0.17957i | 0.50813+0.40041i |

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|  |  |  |  |
| 1 | -0.089803-0.0019236i | -0.037302-0.062978i | 0.26138+0.46893i |
| 2 | -0.046723+0.0043918i | 0.0047796+0.043857i | 0.8959+0.15417i |
| 3 | -0.18715+0.015537i | -0.05944-0.11768i | 0.45971+0.21512i |
| 4 | -0.1451+0.0066126i | -0.051497-0.093946i | 0.23202+0.64517i |
| 5 | -0.15941+0.0070924i | -0.047253-0.08666i | 0.19594+0.60614i |
| 6 | -0.25602+0.012188i | -0.019609-0.016298i | 0.84969+0.18234i |
| 7 | -0.22755+0.00090307i | -0.032626-0.051904i | 0.7416+0.86769i |
| 8 | -0.15841+0.01019i | -0.023556-0.025413i | 0.66221+0.52772i |
| 9 | -0.17543+0.0048156i | -0.028699-0.042833i | 0.10709+0.97453i |
| 10 | -0.18694+0.0068419i | -0.02614-0.034409i | 0.83617+0.28548i |
| 11 | -0.18172+0.0087886i | -0.086179-0.17897i | 0.45491+0.94908i |
| 12 | -0.15097+0.00409i | -0.068825-0.136i | 0.65063+0.6076i |
| 13 | -0.073735+0.0031648i | -0.092301-0.19219i | 0.90442+0.77648i |
| 14 | -0.119+0.0083303i | -0.087161-0.18045i | 0.1107+0.063482i |
| 15 | -0.28787+0.0053603i | -0.00077833+0.023253i | 0.60383+0.59115i |
| 16 | -0.21874+0.0063444i | -0.035911-0.053992i | 0.016382+0.89975i |

As for the optimized variable v, we provide a figure to make it intuitive.



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Algorithm | coordinate |  |  |  |
| Algorithm1 | x | -249.999999281613 | 185.570142596482 | 241.691569532397 |
| y | 38.2881697798314 | -178.821483290456 | 240.529347601659 |
| Algorithm2 | x | -89.6643994430129 | 53.0936500802012 | 57.0766173353032 |
| y | 5.24728052190112 | -62.1791998489849 | 70.72884566385880 |
| Algorithm3 | x | -249.948435541633 | 187.491036698545 | 217.765352141384 |
| y | 79.0374082818245 | -193.175334858108 | 218.664818054356 |

As for the optimized variable z, we provide tables to make it intuitive.

Algorithm 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sorted  contents |  |  |  | MBS |
| 1st | 0 | 0 | 1 | 0 |
| 2nd | 0 | 0 | 1 | 0 |
| 3rd | 0 | 0 | 1 | 0 |
| 4th | 0.90382 | 0 | 0.096183 | 0 |
| 5th | 1 | 0 | 0 | 0 |
| 6th | 0.7904 | 0.2096 | 0 | 0 |
| 7th | 0 | 1 | 0 | 0 |
| 8th | 0 | 1 | 0 | 0 |
| 9th | 0 | 0.18704 | 0 | 0.81296 |
| 10th | 0 | 0 | 0 | 1 |
| 11th | 0 | 0 | 0 | 1 |
| 12th | 0 | 0 | 0 | 1 |

Algorithm 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sorted  contents |  |  |  | MBS |
| 1st | 1 | 0 | 0 | 0 |
| 2nd | 1 | 0 | 0 | 0 |
| 3rd | 1 | 0 | 0 | 0 |
| 4th | 0.096183 | 0 | 0.90382 | 0 |
| 5th | 0 | 0 | 1 | 0 |
| 6th | 0 | 0.2096 | 0.7904 | 0 |
| 7th | 0 | 1 | 0 | 0 |
| 8th | 0 | 1 | 0 | 0 |
| 9th | 0 | 0.18704 | 0 | 0.81296 |
| 10th | 0 | 0 | 0 | 1 |
| 11th | 0 | 0 | 0 | 1 |
| 12th | 0 | 0 | 0 | 1 |

Algorithm 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sorted  contents |  |  |  | MBS |
| 1st | 0.2 | 0.2 | 0.2 | 0.4 |
| 2nd | 0.2 | 0.2 | 0.2 | 0.4 |
| 3rd | 0.2 | 0.2 | 0.2 | 0.4 |
| 4th | 0.2 | 0.2 | 0.2 | 0.4 |
| 5th | 0.2 | 0.2 | 0.2 | 0.4 |
| 6th | 0.2 | 0.2 | 0.2 | 0.4 |
| 7th | 0.2 | 0.2 | 0.2 | 0.4 |
| 8th | 0.2 | 0.2 | 0.2 | 0.4 |
| 9th | 0.2 | 0.2 | 0.2 | 0.4 |
| 10th | 0.2 | 0.2 | 0.2 | 0.4 |
| 11th | 0.2 | 0.2 | 0.2 | 0.4 |
| 12th | 0.2 | 0.2 | 0.2 | 0.4 |

UAV capacity coefficient in this simulation is set as .