

[17] Osama AR, Mohamed AB, Ibrahim EH. (2014). A novel hybrid flower pollination algorithm with chaotic harmony search for solving sudoku puzzles. *International Journal of Engineering Trends and Technology (IJETT)* 7(3): 126-132.

[18] Yang XS. (2010). *Engineering optimization: an introduction with metaheuristic application*. Wiley.

[19] Abbass HA, Sarker R. (2002). The Pareto differential evolution algorithm. *Int. J. Artificial Intelligence Tools* 11(4): 531-552.

[20] Yang XS. *Nature-inspired Metaheuristic Algorithms*. Luniver Press.

[21] Deb K. (2001). *Multi-objective Optimization Using Evolutionary Algorithms*. New York: John Wiley & Sons.

[22] Wang G, Guo L. (2013). A novel hybrid bat algorithm with harmony search for global numerical optimization. *Journal of Applied Mathematics* 2013: 21.

[23] Yang XS. (2010). A new metaheuristic bat-inspired algorithm, nature inspired cooperative strategies for optimization (NISCO 2010). *Springer* 284: 65-74.

[24] Khan K, Sahai A. (2012). A comparison of BA, GA, PSO, BP and LM for training feed forward neural networks in e-learning context. *I.J. Intelligent Systems and Applications* 23-29.

[25] Wasulkabir M, Sakib N Sakib, Syed MRC, Shafiul Alam M. (2014). A novel adaptive bat algorithm to control explorations and exploitations for continuous optimization problems. *International Journal of Computer Applications* 94(13).

[26] Rekaby A. (2013). Directed Artificial Bat Algorithm (DABA) a new bio-inspired algorithm. *International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, Cairo.

[27] Selim Y, Ecir UK. (2013). Improved Bat Algorithm (IBA) on continuous optimization problems. *Lecture Notes on Software Engineering* 1(3): 279-283.

[28] Huang GQ, Zhao W J, Lu QQ. (2013). Bat algorithm with global convergence for solving large scale optimization problem. *Application Research of Computers* 30(3): 1-10.

[29] Asghar A, Abdul Raman AA, Wan Daud WMA. (2014). A comparison of central composite design and taguchi method for optimizing fenton process. *The Scientific World Journal* 2014.

[30] Bremhost K, Graham L.J.W. (1990). A fully compensated hot/cold wire anemometer system for unsteady flow velocity and temperature measurement. *Measurement Science & Technology* 1(5).

[31] Moh'd S, Ahmed Al S. (2006). Optimization of hot wire thermal flow sensor based on neural net model. *Applied Thermal Engineering* 26(8-9): 948-955.

[32] Pijush D, Asok K. (2017). Intelligent calibration technique using optimized fuzzy logic controller for ultrasonic flow sensor. *Mathematical Modelling of*

Engineering Problems 4(2): 91-94.

[33] Satish Chandra B, Samik M. (2012). Study of a simple linearization technique of a p-n junction type anemometer flow sensor. *IEEE Transaction Instrumentation and Measurement* 61(9): 545-2552.

MATLAB CODE FOR TEST

Test :

```
d=[0.222 0.027 .6165 .8982 0.0024
0.225 0.025 .6165 .8982 0.0032
0.234 0.020 .6165 .8982 0.0040
0.239 0.024 .6065 .7254 0.0048
0.247 0.025 .6222 .7797 0.0056
0.250 0.030 .6165 .8982 0.0064
0.254 0.024 .6222 .7797 0.0072
0.261 0.020 .6065 .8982 0.0008
0.265 0.027 .6165 .7797 0.0008
0.218 0.025 .6065 .7797 0.0016
0.221 0.027 .6065 .7254 0.0016
0.232 0.025 .6222 .7797 0.0024
0.235 0.030 .6065 .7254 0.0024
0.237 0.025 .6222 .7797 0.0032
0.238 0.020 .6065 .7254 0.003
0.241 0.025 .6222 .7797 0.0040
0.245 0.025 .6165 .8982 0.0048
0.247 0.030 .6065 .7254 0.0064];
```

For =1:18

```
%sum(i1)=d(i1,1)*u(1)+d(i1,2)*u(2)+d(i1,3)*u(3)+
d(i1,4)*u(4)+u(5);
sum1(i1)=(d(i1,1)^u(1))*(d(i1,2)^u(2))*(d(i1,3)^u(3))*(d(i1,
4)^u(4))*u(5);
end;sum1
sum=0;for
i1=1:18 %z2=d(i1,1)*u(1)+d(i1,2)*u(2)+d(i1,3)*u(3)+d(i1,
4)*u(4)+u(5);
z2=(d(i1,1)^u(1))*(d(i1,2)^u(2))*(d(i1,3)^u(3))*(d(i1,4)^u(4)
)*u(5);
sum=sum+(d(i1,5)-z2)^2;
end;
z=sum
```

for ANOVA

```
coefficint :
14.20 -4.37947 -12.94 2.94 0.350099*10^-3
```

Total error : 6.5656e-04(fmin)

For FPA :

```
coefficint : 1.6563 0.6446 9.9035 -0.1291 50
```

Total error: 5.3291e-05(fmin)