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Power prediction mode technique for Hill Climbing Search algorithm to reach the maximum power point tracking
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Abstract
This paper proposed novel Hill Climbing Search (HCS) algorithm to reach maximum power point tracking (MPPT). The proposed algorithm used two main techniques; the first one is power prediction mode and the second one is the two-mode HCS algorithm. The latter is used to achieve the maximum possible power from Wind Energy Conversion System (WECS) with better efficiency, faster convergence speed and using only two-mode (more simple) to avoid the iteration and delay. Moreover, novel algorithm not requires any prior knowledge of WECS and it's considered absolutely independent of Wind Turbine (WT) generator. The simulation results confirm that the proposed algorithm is remarkably faster by 30 % of the total time required comparing to the mode HCS and more efficient due to simplicity. © 2020 IEEE.

Author Keywords
hill climbing search (HCS); maximum power point tracking (MPPT); wind energy conversion system (WECS); wind turbine (WT)

Index Keywords
Conversion efficiency, Maximum power point trackers, Wind power; Faster convergence, Hill climbing search, Maximum Power Point Tracking, Novel algorithm, Power predictions, Prior knowledge, Wind energy conversion system; Iterative methods

References

- Simoes, M.G., Bose, B.K., Spiegel, R.J.
Fuzzy logic based intelligent control of a variable speed cage machine wind generation system
(1997) *IEEE Transactions on Power Electronics*, 12 (1), pp. 87-95.

- Soloumah, H.M., Kar, N.C.
Fuzzy logic based vector control of a doubly-fed induction generator in wind power application
(2006) *Wind Engineering*, 30 (3), pp. 201-223.

- Qiao, W.
Wind speed estimation based sensorless output maximization control for a wind turbine driving a dfig
(2008) *IEEE Transactions on Power Electronics*, 23 (3), pp. 1156-1169.

- Li, H., Shi, K.
Mclaren neural-network-based sensorless maximum wind energy capture with compensated power coefficient
(2005) *IEEE Transactions on Industry Applications*, 41 (6), pp. 1548-1556.

- Piegari, L., Rizzo, R.
Adaptive perturb and observe algorithm for photovoltaic maximum power point tracking
(2010) *IET Renewable Power Generation*, 4 (4), pp. 317-328.

- Mamarelis, E., Petrone, G., Spagnuolo, G.
  A two-steps algorithm improving the p&o steady state mppt efficiency
  (2014) *Applied Energy*, 113, pp. 414-421.

- Alonso, R.
  An innovative perturb observe and check algorithm for partially shaded pv systems
  (2009) *Power Electronics and Applications, 2009. EPE'09. 13th European Conference on*,

- Fermia, N.
  Predictive & adaptive mppt perturb and observe method
  (2007) *IEEE Transactions on Aerospace and Electronic Systems*, 43 (3).

- Femia, N.
  Optimization of perturb and observe maximum power point tracking method
  (2005) *IEEE Transactions on Power Electronics*, 20 (4), pp. 963-973.

- Yang, Y., Zhao, F.P.
  Adaptive perturb and observe mppt technique for grid-connected photovoltaic inverters
  (2011) *Procedia Engineering*, 23, pp. 468-473.

- Abdelsalam, A.K.
  High-performance adaptive perturb and observe mppt technique for photovoltaic-based microgrids
  (2011) *IEEE Transactions on Power Electronics*, 26 (4), pp. 1010-1021.

- Pradhan, R., Subudhi, B.
  Design and real-time implementation of a new auto-tuned adaptive mppt control for a photovoltaic system
  (2015) *International Journal of Electrical Power & Energy Systems*, 64, pp. 792-803.

- Zhang, F.
  Adaptive hybrid maximum power point tracking method for a photovoltaic system
  (2013) *IEEE Transactions on Energy Conversion*, 28 (2), pp. 353-360.

- Kazmi, S.M.R.
  A novel algorithm for fast and efficient speed-sensorless maximum power point tracking in wind energy conversion systems
  (2011) *IEEE Transactions on Industrial Electronics*, 58 (1), pp. 29-36.

- Badawi, A.S.A.
  Resonant circuit response for contactless energy transfer under variable pwm
  (2017) *International Journal of Information and Electronics Engineering*
  IJIEE, 7 (1), pp. 41-47.

- Badawi, A.S.A.
  (2018) *Weibull Probability Distribution of Wind Speed for Gaza Strip for 10 Years*,

- Badawi, A.S.A.
  Energy and power estimation for three different locations palestine
  (2018) *At Indonesian Journal of Electrical Engineering and Computer Science*,

- Buehring, I., Freris, L.
  Control policies for wind-energy conversion systems
  (1981) *IEE Proceedings C-Generation Transmission and Distribution*,

- Abdullah, M.A.
  A review of maximum power point tracking algorithms for wind energy systems
  (2012) *Renewable and Sustainable Energy Reviews*, 16 (5), pp. 3220-3227.

- Zhao, Y.
  A review on position/speed sensorless control for permanent-magnet synchronous

machine-based wind energy conversion systems
(2013) *IEEE Journal of Emerging and Selected Topics in Power Electronics*, 1 (4), pp. 203-216.

- Li, H.
  The application of improved hill-climb search algorithm in wind power generation
  (2013) *IFAC Proceedings Volumes*, 46 (20), pp. 263-267.

- Lalouni, S.
  Maximum power point tracking based hybrid hill-climb search method applied to wind energy conversion system
  (2015) *Electric Power Components and Systems*, 43 (8-10), pp. 1028-1038.

- Thongam, J.S., Ouhrouche, M.
  Mppt control methods in wind energy conversion systems
  (2011) *Fundamental and Advanced Topics in Wind Power*, Tech

- Zhu, Y.
  A novel maximum power point tracking control for permanent magnet direct drive wind energy conversion systems
  (2012) *Energies*, 5 (5), pp. 1398-1412.

- Dahbi, A.
  Realization and control of a wind turbine connected to the grid by using pmsg
  (2014) *Energy Conversion and Management*, 84, pp. 346-353.

- (2013) *Analytical Study for Establishment of Wind Farms in Palestine to Reach the Optimum Electrical Energy*,

- Badawi, A.S.
  Energy and power estimation for three different locations in palestine
  (2018) *Indonesian Journal of Electrical Engineering and Computer Science*, p. 10.

- Badawi, A.
  Evaluation of wind power for electrical energy generation in the mediterranean coast of palestine for 14 years
  (2019) *International Journal of Electrical and Computer Engineering (IJECE)*, 9 (4), pp. 2212-2219.

- Badawi, A.S.
  Practical electrical energy production to solve the shortage in electricity in palestine and pay back period
  (2019) *International Journal of Electrical and Computer Engineering (IJECE)*, 9 (6), pp. 4610-4616.

- Badawi, A.S.
  Novel technique for hill climbing search to reach maximum power point tracking
  (2020) *Int J Pow Elec & Dri Syst*, 11 (4), pp. 2019-2029.

- Badawi, A.
  Paper review: Maximum power point tracking for wind energy conversion system
  (2020) *IEEE Xplore Digital Library*,

- Badawi, A.S.A.
  (2019) *Maximum Power Point Tracking Control Scheme for Small Scale Wind Turbine*,

- Echchhibat, M.E.
  An Adapted Method for a Small Wind Turbine to Extract the Optimal Power,

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