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Artificial Intelligence Based MPPT Algorithm For Grid Connected Solar PV System

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***Abstract*- ongoing investigates situated to photovoltaic (pv) frameworks highlight blasting enthusiasm for current decade. for productivity improvement, greatest force point following (mppt) of pv exhibit yield power is obligatory. herein the article, different analytical strategies has been discussed based on ai (artificial intelligence). Conventional mppt techniques provide abridged assembly and execution; also its routine is dishonored after associated through reproduction reasoning techniques are uncertain sense regulator (fl), artificial neuronic grid (ang), flexible nerves- uncertain border structure (fnubs). one of farcical ai based technique which name is flexible nerves uncertain border structure get closer and extra accurate outcome against all the ai based technique and also ordinary systems. likewise, this article demonstrates that the anfis strategy is better in all the ai-based mppt power following plans for low overshoot, high dependability with the higher consistent state condition, and less tedious in yield. as, per this proposed technique to the pv array and applying all kind of conditions to it, effective and enhanced outcome has been arrived.**

Index terms- solar energy, maximum power point tacking, artificial neural networks, artificial intelligence, anfis, fuzzy logic.

I. INTRODUCTION

Retaining walls are built generally to hold soil mass. However, they can also be constructed for architectural or land scaping purposes. Retaining walls are structures that are constructed to hold/retain soil or any such granular substance that are generally unable to withstand on their own. They are also provided to maintain the grounds at two different levels.

1. Classification of Retaining Walls

Following are the different types of retaining walls, which is based on the shape and the mode of resisting the pressure;
1. Gravity wall-Masonry or Plain concrete
2. Cantilever retaining wall-RCC (Inverted T andL)
3. Counterfort retaining wall-RCC
4. Buttress wall-RCC

2. Cantilever Retaining Wall

This is a most common type of retaining wall and used for 3 to 8 m height. It consists of three cantilever slabs known as Stem, Heel, and Toe. The wall may be an inverted ‘T’ or ‘L’ shaped where toe projection is missing. The stem acts as a vertical cantilever and stability is provided by the weight of earth on base slab and self-weight of wall. Sometimes a Key is provided in base slab for stability against sliding.

II. RESEARCH FINDINGS

A few studies are done on RE Wall and the outcomes of the researches are as following:-

Magdy M. EL-EMAM et al. experimented with a reduced scale shaking table test & numerical simulation of a wall using FLAC which were subjected to base acceleration i.e. seismic forces. It was concluded that soil plane-strain material properties back-calculated from numerical simulation of physical direct shear tests on backfill samples were required to generate good agreement between physical and numerical wall response features.

A constant reinforcement stiffness value was shown to be a reasonable assumption for numerical modeling of the geogrid reinforcement. However, reinforcement-soil slip for layers with shallow overburden depth was not considered in numerical simulations and this is thought to have led to some discrepancies in reinforcement load response close to the top of the wall.

Not, withstanding the comments made above the numerical model was found to give reasonably accurate predicts of the experimental results despite the complexity of the physical models under investigation. Both numerical and physical models demonstrated that the toe boundary condition has a large influence on wall performance and stability under both static and simulated seismic loading conditions.

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Vignesh et.al.(2012) constructed a RE wall at Saritakunj, New Delhi.It was concluded that reinforced earth technique is particularly advantageous in urban areas where land is scarce and land values are high. Reinforced earth allows construction of walls on the boundary of the world accessible without intruding upon the adjacent land. The technique is straightforward and simple to install. There are solely 3 parts i.e. facing panels, resistance anchors and soil/pond ash. With slight expertise, construction may be allotted with a really quick pace of construction. Pond ash could be used as an alternative to conventional earth as a backfill material. Since there is very little transfer of load to the ground and system being flexible in nature, it can be used on soils with low bearing capacity.

Liyan Wang et.al.(2014) modelled numerically a RE wall in FLAC3D and used FEM based calculation to determine the effect of seismic forces on a HDPE geogrid strengthened RE wall. It had been summarized that the reinforced wall is in inclined deformation state outward, and therefore the residual deformation at the top of wall is that the largest. The coupling shear stresses on the interface between geogrid and soils are smaller within the middle of these layers and bigger in 2 ends of geogrid layers. The reinforced stresses of geogrid placed on higher layers and bottom layers are comparatively smaller. The reinforced stresses of geogrid placed within the middle layers are comparatively larger. The reinforced internal forces of geogrid decrease with the decrease of the reinforcement spacing. The perfect reinforcement spacing is thought of as H/7.5 in unstable styles. The reinforced internal forces of geogrid decrease with the rise of the reinforcement length. The perfect reinforcement length is valued as 1.0 H in unstable designs.

III. MODEL DATA AND MATERIAL PROPERTIES

1. SBC is taken as 120 kN/m2, 150 kN/m2 and 180 kN/m2
2. Different dimensión of stem and base has been applied to check get a stable structure.
3. Structure Dimension detalis
4. Stem has a varying thickness of 0.2-0.4 m at top and 0.3-0.6m at bottom
5. Base has a constant thickness throughout the toe and heel with thickness ranging from 0.3-0.7m
6. Grade of Steel is Fe415 and Grade of Concrete is M20
7. Density of soil is 18 kN/m3 and the angle of repose is 30▫
8. Surcharge load 5 kN/m

Table 1 Concreate details

Concrete		
Density	Modulus Of Elasticity	Poisson ratio
24.2kN/m3	21.72 GPa	0.3

1. Load Calculation

Lateral Earth pressure has been calculate using rankine theory and the Soil pressure has been calculated using classical mechanical theory.

2. Objective of Study

To evaluate the behavior of Retaining wall in cantilever and shelf relief condition.

- To evaluate the behavior of Retaining wall for different SBC condition
- To compare and summarize the results with respect to base pressure, moment etc.
- To compare the cost of various options.

IV. RESULT AND OBSERVATION

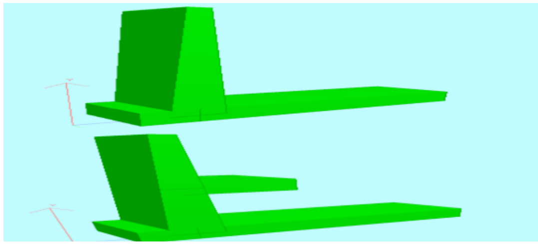

Figure 1. Retaining Wall in Cantilever.

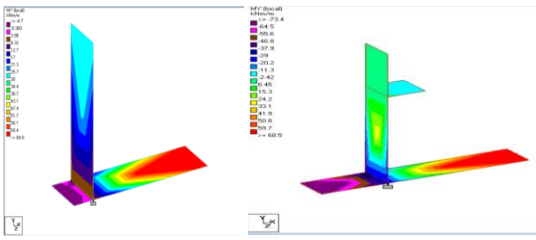

Figure 2. Retaining Wall in Cantilever

Table 2: compare and summarize the results with respect to base pressure, moment

Name	Ht	Allowable	Actual Pre	Concrete	Steel	BM in Ste	Steel kg/n	BM In Ste	Deflection	Cost of ste	Cost of co	Cost of ba	Total Cost
4m SBC 120	4	120	85	3.4	222.068	72	65.31411	78	2.772	55516.99	59976	340	115833
4m SBC 150	4	150	94	2.55	129.7079	69.6	50.86586	76.6		32426.99	44982	340	77748.99
4m SBC 180	4	180	106	2.2	125.9788	70.4	57.26309	76.6		31494.7	38808	340	70642.7
6m SBC 120	6	120	113.2678	6.45	468.754	241.2	72.67503	229.297	18.186	117188.5	113778	510	231476.5
6m SBC 150	6	150	141.7871	4.25	535.8975	230.4	126.0935	229.297	18.186	133974.4	74970	510	209454.4
6m SBC 180	6	180	177.3285	3.6	526.1346	232.2	146.1485	229.297	18.186	131533.6	63504	510	195547.6
8m SBC 120	8	120	158.2322	NA	940.9989	681.472	#VALUE!	NA	NA	235249.7	#VALUE!	680	#VALUE!
8m SBC 150	8	150	148.5034	8.4	1288.774	550	153.4254	545	76	322193.4	148176	680	471049.4
8m SBC 180	8	180	162.7358	7.4	1206.961	550	163.1028	545	76	301740.2	130536	680	432956.2
	Shelf												
4m Shelf SBC 120	4	120	87.86333	2.4	256.1768	10.58	106.7403	10	0.191	64044.2	42336	340	106720.2
4m Shelf SBC 150	4	150	87.86333	2.4	157.7281	10.58	65.72003	9.8	0.191	39432.02	42336	340	82108.02
4m Shelf SBC 180	4	180	87.86333	2.4	140.3445	10.58	58.47686	9.94	0.191	35086.12	42336	340	77762.12
6m Shelf SBC 120	6	120	118.9031	3.6	365.5684	77.44	101.5468	70	18.8	91392.09	63504	510	155406.1
6m Shelf SBC 150	6	150	101.1021	3.52	343.686	77.44	97.63808	70	18.8	85921.51	62092.8	510	148524.3
6m Shelf SBC 180	6	180	168.925	3.2	334.3749	77.44	104.4922	70	18.26	83593.72	56448	510	140551.7
8m Shelf SBC 120	8	120	119.6838	7.8	865.9755	249.275	111.0225	238	42.9	216493.9	137592	680	354765.9
8m Shelf SBC 150	8	150	138.8029	7.5	928.4455	261.36	123.7927	277	42.8	232111.4	132300	680	365091.4
8m Shelf SBC 180	8	180	161.3351	7.2	896.455	261.36	124.5076	244	44.76	224113.8	127008	680	351801.8

V. CONCLUSIONS

1. The Actual pressures should monotonically increase in the base pressure in case of cantilever retaining wall but irregular in case of shelf structure this might happen due to change in thickness of base slab as the height increses.
2. The steel consumption is particularly low in case of Shelf relief wall than free standing as the moment has been reduceed in stem wall which has a large steel requirement.
3. The maximum difference of 30% has been observed in the steel consumption.
4. The cost of shelves structures has been decerasing and then increasing as we increase height w.r.t to cantilever retaining wall.
5. The maximum difference in cost is around 40% .

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