Iwan Setiawan <iwansetiawan@live.undip.ac.id>

Fwd: [IREE] Editor decision for paper Id 8387

2 messages

Praise Worthy Prize Editorial Staff <praiseworthyprize@gmail.com> Thu, Apr 28, 2016 at 3:51 PM
To: iwansetiawan@live.undip.ac.id

Dear dr. Setiawan
because the current issue of IREE where your paper ha been scheduled must be closed in very few days, please be so kind to upload the revised version of the paper at earliest, so we can proceed with the next steps for publishing it.
I'm looking forward to your kind reply.

Best Regards

Francesca Scialla
Member of the Editorial Staff

****
****
PRAISE WORTHY PRIZE S.r.l.
PUBLISHING HOUSE
Editorial Staff

editorialstaff@praiseworthyprize.com

+++++++++++++++++++++ ATTENTION ++
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---------- Forwarded message ----------
From: **Editorial Staff** <editorialstaff@praiseworthyprize.org>
Date: 2016-04-19 22:57 GMT+02:00
Subject: [IREE] Editor decision
To: iwansetiawan@live.undip.ac.id

Dear dr. Iwan Setiawan,

Manuscript ID 8387 entitled “Control Strategy based on Associative Memory Networks for a Grid-Side Converter in On-Grid Renewable Generation Systems under Generalized Unbalanced Grid Voltage Conditions” which you submitted to our Journal “International Review of Electrical Engineering (IREE)” has been reviewed. The comments of the reviewer(s) are included at the bottom of this email. I apologize for the lengthy review period.

The reviewer(s) have recommended a MAJOR REVISION.
This is an opportunity for you to respond to their major concerns and to incorporate improvements in the paper according to their suggestions. It is also an opportunity for you to add new results.
We normally only permit one major revision before an accept or reject decision is made. So please take the concerns of the reviewers seriously.

Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript within two weeks from the date of this email.

If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.
You should revise your manuscript using a word processing program and save it on your computer. Please also highlight the changes to your manuscript within the document by using the colored text in red.
Once the revised manuscript is prepared, you can upload it and submit it through your on-line submission system.
In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).

Once again, thank you for submitting your manuscript to our Journal and I look forward to receiving your revision.

Sincerely,
Dr. Santolo Meo, Editor-in-Chief of International Review of Electrical Engineering (IREE)
santolo.meo@unina.it

Reviewer Responses:

Reviewer: 1
Recommendation: Accepted with major revisions.

Comments:
1
The paper doesn't have a nomenclature therefore it is difficult to follow the explanation of the contents.

2
The conclusion is extremely weak.

Reviewer: 2
Recommendation: Accepted with major revisions.

Comments:
1
In the conclusion section you should give some comparisons and/or considerations among the features of your suggested method with respect to other approaches proposed in literature.

2
Very few references from authors' past works that can prove their experience on the topic are included. The authors if possible should include other works.

3
In the introduction section the authors should more underline the highlights of the submission, respect to the papers already published in literature.

4
The English must be improved.

Reviewer: 3
Recommendation: Accepted with major revisions.

Comments:
1
A list of symbols should be given.

2
The figures 6-11 should be more explained and discussed.

3
In the conclusion section you should indicate also which are the limits of your proposed approach. Where are the borders and the weak points?

For any questions don't hesitate to contact us.
Best regards,
Editorial Staff
Praise Worthy Prize
Publishing House
editorialstaff@praiseworthyprize.org

PRAISE WORTHY PRIZE
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editorialstaff@praiseworthyprize.com

Iwan Setiawan <iwansetiawan@live.undip.ac.id> Fri, Apr 29, 2016 at 5:13 PM
To: Praise Worthy Prize Editorial Staff <praiseworthyprize@gmail.com>

Dr. Francesca Scialla

Member of the Editorial Staff

Of International Review of Electrical Engineering (IREE)

29 April 2016

Dear Dr. Francesca Scialla

Re: Manuscript ID 8387

Thank you very much for the e-mail.

We have upload the revised manuscript (Manuscript ID 8387) with title "Control Strategy based on Associative Memory Networks for a Grid-Side Converter in On-Grid Renewable Generation Systems under Generalized Unbalanced Grid Voltage Conditions" on april 29, 2016

Please find attached our revised manuscript, e-mail for Dr. Santolo Meo and our responses to the reviewers' comments

Sincerely yours,

Iwan Setiawan

Department of Electrical Engineering

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[Quoted text hidden]

3 attachments

AMN Control strategy for unbalance voltage conditions IREE journal-the revision.doc
2962K

email for Dr. Santolo Meo- Editor-in-Chief of IREE.docx
24K

our response to reviewers.docx
46K

Manuscript ID 8387
Paper Title : Control Strategy based on Associative Memory Networks for a Grid-Side Converter in On-Grid Renewable Generation Systems under Generalized Unbalanced Grid Voltage Conditions

Response to Reviewer #1

Dear Reviewer

We would like to thank you for your valuable comments that helped us to improve our paper. Please find below our detailed reply to your comments.

Sincerely yours,

Iwan Setiawan et al.

Comments of Reviewer #1

1. The paper doesn't have a nomenclature therefore it is difficult to follow the explanation of the contents.

Authors' Response:

Thank you for your reminder. In the revised manuscript, We have added a nomenclature that placed right before Introduction Section, as follows:

NOMENCLATURE

$e_{\alpha\beta s}$, $v_{\alpha\beta s}$	Grid and converter voltage vectors
$i_{\alpha\beta s}$	Grid current vector
L	Line inductance
R	Line resistance
C	DC link capacitance
ω_g	Grid frequency
ω_s	synchronous frequency
V_{dc}	DC link voltage
e_{dq},i_{dq}	rotating grid voltage and current vector
e_d,i_d	d-axis component of grid voltage and current vector
e_q,i_q	q-axis component of grid voltage and current vector
u_b	AMN output
P_0,Q_0	constant active and reactive power
P_1,P_2	active power high-order coefficients
Q_1,Q_2	reactive power high-order coefficients
$\sigma(.)$,X	AMN basis function output and input vector
w,p	AMN adaptive weight and the weight numbers
u_{pi}	output of PI controller
s	laplace operator
K_p, T_i	Proportional gain and Time integrator of PI controller
T_{cl}	desired time constant of the closed loop system.
$V(.)$	Lyapunov function candidate
e	error of the closed loop control system
i_{dc_s}	renewable power source DC current
i_{dc_g}	grid side converter DC current

Superscripts

j	Imaginary number
$+$	positive sequence
$-$	Negative sequence

2. The conclusion is extremely weak

Authors' Response:

Thank you for your suggestion. In the revised version, we have revised the whole conclusion of the paper carefully, so now our conclusion is more clear and stronger. Below is the new conclusion of our paper.

The combination of a simple proportional gain controller and B-Spline Associative Memory Networks (AMN) for regulating the DC link capacitor voltage of grid-connected renewable energy systems under generalized unbalanced grid voltage conditions has been proposed in this paper. By utilizing a dual current control loop scheme in which positive and negative sequence of the converter current controlled independently, the proposed controller in the steady state is able to reduce the fluctuation of the DC link voltage and the oscillation of the injected active power due to unbalanced grid voltage conditions. Whereas, in the transient state, the proposed AMN controller could effectively reduce the overshoot and the undershoot of the DC link capacitor voltage due to sudden changes of the power which is generated by renewable energy systems.

Although without a training phase, the performance of the proposed controller is more superior compared to a standar PI controller with Symmetric Optimum controller parameters, besides the ITAE performance index is more smaller, the overshoot/undershoot in transient states resulted by the AMN controller is also more reduced. For the initial condition in which the control system start to operate, the overshoot/undershoot resulted by the proposed controller in the response to an input power change is about 15% lower compared with that resulted by the optimal PI controller. As can be seen from the simulation results, the transient performance of the proposed controller will improve drastically if the changes of the power have relatively same pattern with the previous ones. In these cases, the proposed controller is able to reduce the overshoot almost 60% lower than that of the optimal PI control system both in balanced and unbalanced grid voltage conditions. So that the overvoltage of the DC link capacitor due to abrupt changes of the active power generated by renewable generation systems could be effectively avoided.

As other control approaches, The performance of our proposed controller basically is depend on several control parameters. For the chosen basis function order, the transient performance of the proposed control system strongly depends on a chosen simple proportional gain (K_p) and a learning rate of the AMN (α). In our work, the appropriate learning rate parameter of the AMN in our proposed controller is still choosen empirically. In future work, the optimal values of the proposed control parameters will be investigated.

Manuscript ID 8387
Paper Title : Control Strategy based on Associative Memory Networks for a Grid-Side Converter in On-Grid Renewable Generation Systems under Generalized Unbalanced Grid Voltage Conditions

Response to Reviewer #2

Dear Reviewer

We would like to thank you for your valuable comments that helped us to improve our paper. Please find below our detailed reply to your comments.

Sincerely yours,

Iwan Setiawan et al.

Comments of Reviewer #2

1. In the conclusion section you should give some comparisons and/or considerations among the features of your suggested method with respect to other approaches proposed in literature.

Authors' Response:

Thank you for your suggestion. In the revised manuscript, we have compared the performance of the proposed controller with the performance of a Symmetric Optimum PI controller under the same grid conditions. Please see the second paragraph of our new conclusion below.

The combination of a simple proportional gain controller and B-Spline Associative Memory Networks (AMN) for regulating the DC link capacitor voltage of grid-connected renewable energy systems under generalized unbalanced grid voltage conditions has been proposed in this paper. By utilizing a dual current control loop scheme in which positive and negative sequence of the converter current controlled independently, the proposed controller in the steady state is able to reduce the fluctuation of the DC link voltage and the oscillation of the injected active power due to unbalanced grid voltage conditions. Whereas, in the transient state, the proposed AMN controller could effectively reduce the overshoot and the undershoot of the DC link capacitor voltage due to sudden changes of the power which is generated by renewable energy systems.

Although without a training phase, the performance of the proposed controller is more superior compared to a standar PI controller with Symmetric Optimum controller parameters, besides the ITAE performance index is more smaller, the overshoot/undershoot in transient states resulted by the AMN controller is also more reduced. For the initial condition in which the control system start to operate, the overshoot/undershoot resulted by the proposed controller in the response to an input power change is about 15% lower compared with that resulted by the optimal PI controller. As can be seen from the simulation results, the transient performance of the proposed controller will improve drastically if the changes of the power have relatively same pattern with the previous ones. In these cases, the proposed controller is able to reduce the overshoot almost 60% lower than that of the optimal PI control system both in balanced and unbalanced grid voltage conditions. So that the overvoltage of the DC link capacitor due to abrupt changes of the active power generated by renewable generation systems could be effectively avoided.

As other control approaches, The performance of our proposed controller basically is depend on several control parameters. For the chosen basis function order, the transient performance of the proposed control system strongly depends on a chosen simple proportional gain (K_p) and a learning rate of the AMN (α). In our work, the appropriate learning rate parameter of the AMN in our proposed controller is still choosen empirically. In future work, the optimal values of the proposed control parameters will be investigated.

2. Very few references from authors' past works that can prove their experience on the topic are included. The authors if possible should include other works.

Authors' Response:

Thank you for your valuable suggestion. In the revised manuscript, we have included an additional reference from our past works, so now there two references from our previous works which is relevant with this topic. Below is the additional description that is included in the Introduction Section.

In the proposed scheme, the AMN is used as a nonlinear adaptive integrator placed in the outer control loop of the GSC. Whereas in the inner loop, a dual current control loop is adopted to control positive and negative sequence components of current. The proposed control scheme basically is the improvement of our past work [22][23]. In our previous works, the designed AMN controller would give satisfactory performance to operate just under balanced grid voltage condition.

Manuscript ID 8387

Paper Title : Control Strategy based on Associative Memory Networks for a Grid-Side Converter in On-Grid Renewable Generation Systems under Generalized Unbalanced Grid Voltage Conditions

3. In the introduction section the authors should more underline the highlights of the submission, respect to the papers already published in literature.

Authors' Response:

Thank you for your suggestion. In the revised manuscript, we have given more highlights of the submission. Below is the additional description that we include in the two last paragraph in the Introduction section.

The purpose of this study is twofold: first, in the steady state, to reduce the DC link capacitor voltage and grid power fluctuations due to unbalanced grid voltage conditions, second, in the transient state, to dampen overshoot of the DC link capacitor voltage due to sudden changes of the active power generated by renewable generation systems so that the overvoltage of the DC link capacitor could be avoided.

To show the effectiveness of the proposed AMN control system, in this paper, the performance of the designed controller is compared with that of a standard PI controller with symetrical optimum parameters [26]. By using Simulink software, it is shown that the proposed controller at initial condition could reduce the overshoot 15% lower than that of the PI controller in the response to disturbances. Even, due to the AMN internally possess the adaptive and associative properties, the improvement in the transient performance will be achieved if the relatively similar disturbance reoccur in the control system. In these cases, the proposed controller is able to reduce the overshoot almost 60% lower than that of the optimal PI control system both in the balanced and unbalanced grid voltage conditions.

4. The English must be improved.

Authors' Response:

Thank you for your useful suggestion on the English of our manuscript. We have rechecked the manuscript carefully and revised the typos and tried to avoid any grammar error or syntax error. Even, to improve the English, we have revised the whole Simulation Result and Discussion section and also the whole conclusion section of our paper.

Manuscript ID 8387
Paper Title : Control Strategy based on Associative Memory Networks for a Grid-Side Converter in On-Grid Renewable Generation Systems under Generalized Unbalanced Grid Voltage Conditions

Response to Reviewer #3

Dear Reviewer

We would like to thank you for your valuable comments that helped us to improve our paper. Please find below our detailed reply to your comments.

Sincerely yours,

Iwan Setiawan et al.

Comments of Reviewer #3

1. A list of symbols should be given.

Authors' Response:

Thank you for your reminder, In the revised manuscript, We have added A list of symbols that placed right before the introduction section, as follows:

NOMENCLATURE

$e_{\alpha\beta s}$, $v_{\alpha\beta s}$	Grid and converter voltage vectors
$i_{\alpha\beta s}$	Grid current vector
L	Line inductance
R	Line resistance
C	DC link capacitance
ω_g	Grid frequency
ω_s	synchronous frequency
V_{dc}	DC link voltage
e_{dq},i_{dq}	rotating grid voltage and current vector
e_d,i_d	d-axis component of grid voltage and current vector
e_q,i_q	q-axis component of grid voltage and current vector
u_b	AMN output
P_0,Q_0	constant active and reactive power
P_1,P_2	active power high-order coefficients
Q_1,Q_2	reactive power high-order coefficients
$\sigma(.)$,X	AMN basis function output and input vector
w,p	AMN adaptive weight and the weight numbers
u_{pi}	output of PI controller
s	laplace operator
K_p, T_i	Proportional gain and Time integrator of PI controller
T_{cl}	desired time constant of the closed loop system.
$V(.)$	Lyapunov function candidate
e	error of the closed loop control system
i_{dc_s}	renewable power source DC current
i_{dc_g}	grid side converter DC current

Superscripts

J	Imaginary number
+	positive sequence
-	Negative sequence

2. The figures 6-11 should be more explained and discussed.

Authors' Response:

Thank you for your valuable suggestions. To fulfill your suggestions, we have added more description for Fig.6 until Fig. 11 in our revised manuscript.

Manuscript ID 8387

Paper Title : Control Strategy based on Associative Memory Networks for a Grid-Side Converter in On-Grid Renewable Generation Systems under Generalized Unbalanced Grid Voltage Conditions

Below is the new explanation for Fig.6

From Fig.6(a) it is shown that in the transient state, the performance of the AMN control system with dual current control loop is more superior compared to that of the standar PI-based controllers. In this case, the overshoot of the DC link capacitor voltage due to the sudden change of the source DC current under the AMN controller is more damped than that of the PI-based controllers. It is also shown that the DC link voltage response under the PI-single and PI-dual current control loop are relatively the same, this is because both of the controllers have the same capability to control positive sequence converter current.

For the sudden change of the source DC current, the the active power injected to the grid is shown in Fig.6(b). From the plots, it is clear that the AMN controller has fast transient response compared to that of the PI-based controllers. Table 4 summarizing the performance parameters of the DC link voltage control system under those three different control schemes.

Below is the new explanation for Fig.7

Moreover, to explore the adaptive capability of the proposed AMN controller, in this work, the proposed controller is tested by the reoccurring changes of the DC current which is injected by the renewable generation system. Further, the performance of the designed controller is investigated and compared with the standard PI controllers. Fig. 7(a) and Fig. 7(b) respectively show the changes of the source DC current and active power which could be regarded as disturbance to the control system. The output responses of the three different controllers due to the disturbance is shown in Fig.8.

Below is the new explanation for Fig.8

By observing Fig. 8(a) carefully, it is shown that the overshoot and undershoot of the DC link capacitor voltage under the AMN control strategy for the first disturbance (the first change of the source DC current) is just about 15% lower than that of the standar PI controllers. However for the second and next disturbances, the overshoot and undershoot of the DC link capacitor voltage is reduced drastically as shown in Fig. 8(c). From the plot, it can be seen that the overshoot/undershoot reduction is almost 60% compared to that of the optimal PI controllers. The improvement of the DC link voltage response in transient states under the AMN control strategy basically came from the AMN capability to remember the previous input disturbances patterns

From Fig. 8(b) and Fig. 8(d), we can see the active power that injected to the grid under the three different controllers. As shown in the plots, the AMN controller has fast transient response compared to the PI-based controllers.

Below is the new explanation for Fig.9

The steady state performance of the DC link capacitor voltage and grid power under unbalanced grid voltage conditions basically just depend on the scheme of the inner current control loop. The control scheme of the outer DC link voltage, in this case will only influence the transient performance of DC link capacitor voltage and grid power. Fig. 9(a), 9(b), and Fig. 9(c), respectively show the steady state conditions of the DC link voltage, the grid power and the grid current under the unbalanced voltage condition in response to 7000 W DC power that injected by the renewable power generation system for the three different current control loop schemes.

Fig. 9(a) show steady state response of the standar PI with inner single current control loop under unbalances grid voltage conditions. From those plots it is shown that the condition of the DC link voltage and grid power of the standard PI single current control loop system will oscillate under unbalanced grid voltage condition, besides that the converter system also will generate imperfect sinusoidal currents that contains many harmonics. Those conditions are emerge due to the negative sequence of the current component that appear in the unbalanced grid is not controlled.

The different steady state response under unbalance voltage conditions is shown in Fig 9(b) and Fig. 9(c). those plots respectively are resulted from the AMN and PI dual current control loop. By careful inspection, the steady state performance of those two controller is almost similar, in these case, the oscillation of the DC link voltage and grid power under unbalanced grid voltage condition is much lower compared with that of standard PI single current control loop. This is due to both the positive and negative component of the converter currents are controlled independently. Also as shown in the plots, the dual current control loop scheme in this case has capability to generate the unbalanced harmonic-free grid current.

Although the steady state performance of the DC link capacitor voltage and the grid power under unbalanced grid voltage conditions for the PI dual current control loop and the AMN control system are relatively the same (as shown in Fig. 9(b) and Fig. 9(c)). However in the transient state, the performance of the AMN controller under unbalanced grid voltage conditions with dual current control loop is more superior compared to the standar PI-based controllers

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Below is the new explanation for Fig.10

Fig. 10(a) and Fig. 10(b) respectively shows the transient response of the DC link capacitor voltage and grid power due to a sudden change of the DC current which is generated by the renewable power generation system for the three different control schemes. If observed carefully, the transient performance of the three different control strategies under unbalanced grid voltage conditions is relatively the same with that of the controller under balanced grid voltage conditions (Fig. 6). However due to unbalance voltage, the responses of the DC link voltage and grid power in Fig. 9 will be oscillate (with different magnitude) shortly after the transient state passed.

Below is the new explanation for Fig.11

Fig. 11 show the transient states of the DC link capacitor voltage and grid power under unbalanced voltage conditions due to the changes of the DC current injection for the three different control scheme. Almost similar to the previous results (Fig. 8), the overshoot and undershoot of the DC link capacitor voltage and the grid power for the second and next disturbance pulses is more reduced compared to the first disturbance. Referring to the zoom of the plot in Fig 11.c, the AMN control system in this case is able to reduce the overshoot almost 60% lower compared to the optimal PI controller. This capability actually came from adaptive properties and associative properties belong to the AMN.

3. In the conclusion section you should indicate also which are the limits of your proposed approach. Where are the borders and the weak points?

Authors' Response:

Thanks for your valuable suggestions. In the revised manuscript, we have included the limitation of our proposed control. Please see the last paragraph of the conclusion below.

The combination of a simple proportional gain controller and B-Spline Associative Memory Networks (AMN) for regulating the DC link capacitor voltage of grid-connected renewable energy systems under generalized unbalanced grid voltage conditions has been proposed in this paper. By utilizing a dual current control loop scheme in which positive and negative sequence of the converter current controlled independently, the proposed controller in the steady state is able to reduce the fluctuation of the DC link voltage and the oscillation of the injected active power due to unbalanced grid voltage conditions. Whereas, in the transient state, the proposed AMN controller could effectively reduce the overshoot and the undershoot of the DC link capacitor voltage due to sudden changes of the power which is generated by renewable energy systems.

Although without a training phase, the performance of the proposed controller is more superior compared to a standar PI controller with Symmetric Optimum controller parameters, besides the ITAE performance index is more smaller, the overshoot/undershoot in transient states resulted by the AMN controller is also more reduced. For the initial condition in which the control system start to operate, the overshoot/undershoot resulted by the proposed controller in the response to an input power change is about 15% lower compared with that resulted by the optimal PI controller. As can be seen from the simulation results, the transient performance of the proposed controller will improve drastically if the changes of the power have relatively same pattern with the previous ones. In these cases, the proposed controller is able to reduce the overshoot almost 60% lower than that of the optimal PI control system both in balanced and unbalanced grid voltage conditions. So that the overvoltage of the DC link capacitor due to abrupt changes of the active power generated by renewable generation systems could be effectively avoided.

As other control approaches, The performance of our proposed controller basically is depend on several control parameters. For the chosen basis function order, the transient performance of the proposed control system strongly depends on a chosen simple proportional gain (K_p) and a learning rate of the AMN (α). In our work, the appropriate learning rate parameter of the AMN in our proposed controller is still choosen empirically. In future work, the optimal values of the proposed control parameters will be investigated.