Reviewer: The manuscript entitled 'Period Doubling route to chaos in Photorefractive Two Wave Mixing' is very well-written, and the author has established a very clear framework. This manuscript proposes to use the PR-TWM setting to control the generation of complex signals without any external feedback, making it much simpler than the existing system. It has certain significance for applications such as photon reservoir computing, material internal computing, and photon neuromorphic networks. In general, I think this is a manuscript that I recommend to publish after including minor revisions.

Authors Response: We, the authors thank the reviewer for his invaluable time and efforts in reviewing the paper. We are encouraged by the positive response of the reviewer. His insightful and thoughtful comments were truly educative and has helped enhancing the quality of this paper. We have carefully considered all the questions and concerns raised by the reviewer, and have put our best efforts to address them comprehensively.

Reviewer: （1）In the phenomenon shown in Figure 2, what caused the energy exchange between two beams of light?

Why is there a 90-degree phase difference between the irradiation pattern and the produced refractive index grating in space?

Authors Response: The intensity pattern produced in the material due to interference of two beam is sinusoidal. The charge distribution after the excitation and trapping will also follow this sinusoidal pattern. So now the sinusoidal charge distribution produces an electric field whose strength is proportional to the gradient of the charge distribution (consequence of Poisson's law). Since a sinusoid and is gradient are phase shifted by 90-degrees, the charge distribution and electric field are also phase shifted by. 90-degrees. The refractive index spatially aligns with the electric field (through Pockel's effect). Hence the irradiating intensity pattern and the resulting refractive index pattern are phase shifted by 90-degrees.

Now, coming to energy exchange, the irradiating pattern and the refractive index pattern being phase shifted by 90-degrees is the reason behind the energy exchange process. The phase shifted grating formed in the material affects (diffracts) the light beams that originally created the grating, which as a result writes a new grating, which again modifies the light beams, and the process goes on until a saturation is reached. This process is called `self-diffraction' and the grating formed at the saturation point diffracts light is such a way that more light is pumped into the direction of one of the beams, resulting in energy exchange process. The above explanation has been made more explicit in the revised version.

Revision:

[105-113]: The intensity pattern produced in the material due to interference of two beam is sinusoidal in nature. The charge distribution after the excitation and trapping processess will also follow this sinusoidal pattern. Now the sinusoidal charge distribution produces an electric field whose strength is proportional to the gradient of the charge distribution (consequence of Poisson's law). Since a sinusoid and its gradient are phase shifted by 90 ^{o}, the charge distribution and electric field are also phase shifted by 90o. Then the refractive index pattern is generated which spatially aligns with the electric field (through Pockel's effect). Hence the irradiating intensity pattern and the resulting refractive index pattern are phase shifted by 90°.

[121-128]: The irradiating pattern and the refractive index pattern being phase shifted by 90o is the reason behind the energy exchange process. The phase shifted grating formed in the material affects (diffracts) the light beams that originally created the grating, which as a result writes a new grating, which again modifies the light beams, and the process goes on until a saturation is reached. This process is called 'self-diffraction' and the grating formed at the saturation point diffracts light in such a way that more light is pumped into the direction of one of the beams, resulting in the energy exchange process.

Reviewer:（2）In the results and discussions of the fourth part of the article, what kind of behavior does the intensity of the output signal show when a larger electric field is applied ? Does it show a clear periodicity ?

Authors Response: When larger electric field is applied the intensity of the output signal shows more peaks with closely packed together. No it does not show any clear periodicity. This point has been added in the revised version as follows,

Revision:

[259-262]: When the applied electric field is increased further then the intensity of the output signal shows more closely packed peaks with no clear periodicity