Reply to "Comment on 'Synchronization in a ring of four mutually coupled van der Pol oscillators: Theory and experiment' "

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The validity of desynchronization in Fig. 2 [B. Nana and P. Woafo, Phys. Rev. E **74**, 046213 (2006)] is justified by the fact that the oscillators are nonidentical (instead of identical as quoted in Perlikowski *et al.*) and by the role of phase differences in synchronization of self-sustained oscillators.

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In their Comment [1], Perlikowski *et al.* questioned the results presented in Figs. 2 and 8 of Ref. [2]. As noted by Perlikowski *et al.*, Fig. 8 shows a quasiperiodic state instead of a chaotic one. As the results of Fig. 8 are concerned, the oscillators are not identical as said in the Comment. The driving signals are not the same for all coupled oscillators that are different in d_i, k_i, and F_i as in Sec. II B of [2] as imposed by experimental constraints. The quantities k and F on the axis of Fig. 2 are respectively the mean values $k=(k_1+k_2+k_3+k_4)/4$ and $F=(F_1+F_2+F_3+F_4)/4$. Typically, $F_1=f+0.13$, $F_2=f+0.133$, $F_3=f+0.132$, $F_4=f+0.134$, $k_1=c+0.23$, $k_2=c+0.225$, $k_3=c+0.224$, $k_4=c+0.226$, and the parameters f and c are varied from -0.12 and -0.22, respectively. The identity of oscillators is assumed only for analytical consideration in view of having a sketch of the desynchronization boundaries. The desynchronization obtained in Fig. 2 is thus explained not only because of the difference in d_i, k_i, and F_i, but also by the fact that in the quasiperiodic state of the van der Pol oscillators, there are two oscillatory components, one due to the self-sustained oscillations and the other related to the driving signal. The self-sustained oscillations depend on initial conditions and the four oscillators launched with different initial conditions will circulate on the same trajectory, but with different phases if there is no appropriate coupling coefficient.

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[1] P. Perlikowski, A. Stefanski, and T. Kapitaniak, preceding paper, Phys. Rev. E **77**, 048201 (2008).

[2] B. Nana and P. Woafo, Phys. Rev. E **74**, 046213 (2006).

