Now we use this definition to draw the TFL patterns based on known interaction structure and oscillation data. Figures. 3(b) and 3(c) show TFL structures corresponding to the oscillation patterns of Figs. 2(c) and 2(d), respectively. From the TFL patterns all the above questions can be understood without any ambiguity. First, we have revealed in Fig. 3(b) and Fig. 3(c) the wave sources – 1D source loops (linked by the pink nodes) from the large number of possible candidates of topological loops in Fig. 2(a). In the source loops all red bold arrowed lines show L-RCs ($A_1^{'} \longrightarrow B_1$, $B_1^{'} \longrightarrow A_1$ in Fig. 3(b); $A_2^{'} \longrightarrow B_2$, $B_2^{'} \longrightarrow C_2$, $C_2^{'} \longrightarrow A_2$ in Fig. 3(c)) and all other arrowed lines come from local chains. In Figs. 2(c) and 2(d) all the local chains in the source loops are shown by bold lines, and the source centers in each pattern are identified by red disks, such as: double centers (A_1, B_1) with the source loop $A_1 \xrightarrow{bold\ line} A_1^{'} \xrightarrow{L-RC} B_1 \xrightarrow{bold\ line} B_1^{'} \xrightarrow{L-RC} A_1$ for Fig. 2(c); and triple centers (A_2, B_2, C_2) with the source loop $A_2 \xrightarrow{bold\ line} A_2^{'} \xrightarrow{L-RC} B_2 \xrightarrow{bold\ line} B_2^{'} \xrightarrow{L-RC} C_2 \xrightarrow{bold\ line} C_2^{'} \xrightarrow{L-RC} A_2$ for Fig. 2(d).

Via TFL patterns of Figs. 3(b) and 3(c) we can not only understand the problem which target centers are the true centers of the oscillations (red square nodes), but also understand how waves propagate from the source centers to all the sub-target centers ($STCs$, shown by blue square nodes), and then produce groups of target waves successively in the patterns. Taking the sub-target center STC_6 in Fig. 2(c) as an example, we realize from the TFL pattern of Fig. 3(b) that waves start from the source target center A_1 and propagate through the path $A_1 \longrightarrow STC_4 \longrightarrow STC_6$. All these sub-target centers take their fixed positions in the TFL structures, and the problems how these centers are driven by upstream nodes (through L-RCs) and how they drive their downstream nodes (through various sub-target waves supported by local couplings) are illustrated clearly.

IV. CONTROL OF SELF-SUSTAINED OSCILLATIONS IN EXCITABLE COMPLEX NETWORKS

The most interesting point is that we can perform pattern control and regulation based on the TFL patterns. Our task is to effectively suppress oscillations. By ″effective″ we mean to change as small as possible number of couplings. If TFL patterns in Fig. 3 make sense we expect that removing a single L-RC on the source loop can suppress the given target waves in the whole pattern. In Fig. 4(a) we plot $< u(t) >= \frac{1}{N^2}\sum_{i,j=1}^{N=100} u_{i,j}(t)$ and $< v(t) >= \frac{1}{N^2}\sum_{i,j=1}^{N=100} v_{i,j}(t)$ vs t, and show that $< u(t) >$ and $< v(t) >$ damps to zero after a single L-RC $B_1^{'}A_1$ of Fig. 2(c) is discarded. A snapshot of pattern evolution after discarding $B_1^{'}A_1$ is presented in Fig. 4(b) where the system is approaching to the homogeneous rest state. The damping process after discarding L-RC $B_1^{'}A_1$ can be well explained based on the TFL pattern of Fig. 3(b). When we remove $B_1^{'}A_1$, the source loop $A_1 \longrightarrow A_1^{'} \longrightarrow B_1 \longrightarrow B_1^{'} \longrightarrow A_1$ breaks, and thus the source centers A_1, B_1 no longer emit waves, and the target waves from centers A_1, B_1 first damp. Without excitations from