**Supplementary file 1a: Parameters for searching topologies**

|  |  |
| --- | --- |
| $$v\_{ij},(i,j=1,2,3)$$ | $10^{x}$, where $x$ is uniformly distributed in [0,2] |
| $$K\_{ij},(i,j=1,2,3)$$ | $10^{x}$, where $x$ is uniformly distributed in [-2,2] |
| $$δ\_{i},(i=1,2,3)$$ | $10^{x}$, where $x$ is uniformly distributed in [-1,1] |
| $$r\_{i},(i=1,2,3)$$ | $10^{x}$, where $x$ is uniformly distributed in [0,2] |
| $$τ^{noise}$$ | $$1$$ |
| $$∆t$$ | $10^{-3}T$, where $T$ is the period length |
| $$σ$$ | $$1$$ |
| $ε$ for extrinsic noise | $$0.5$$ |
| $V$ for intrinsic noise | $$100$$ |

**Supplementary file 1b: Parameters used in Figure 4**

|  |  |
| --- | --- |
| $$v\_{BA}$$ | $$4.5$$ |
| $$v\_{AB}$$ | $$30.5$$ |
| $$v\_{BB}$$ | $$7$$ |
| $$K\_{BA}$$ | $$0.42$$ |
| $$K\_{AA}$$ | $$0.03$$ |
| $$K\_{BB}$$ | $$0.07$$ |
| $$r\_{A}$$ | 0.4 |
| $$r\_{B}$$ | 0.5 |
| $$δ\_{A},δ\_{B}$$ | $$0$$ |
| $$τ\_{noise}$$ | $$1$$ |
| $$σ$$ | $$1$$ |
| $ε$ for extrinsic noise | $$0.5$$ |
| $V$ for intrinsic noise | $$100$$ |

**Supplementary file 1c: Parameters used in Figure 5**

|  |
| --- |
| Activator-inhibitor  |
| $$v\_{BA}$$ | $$18.8$$ |
| $$v\_{AB}$$ | $$2.8$$ |
| $$v\_{BB}$$ | $$44.8$$ |
| $$K\_{BA}$$ | $$0.15$$ |
| $$K\_{AA}$$ | $$0.016$$ |
| $$K\_{BB}$$ | $$0.03$$ |
| $$r\_{A}$$ | $$1.3$$ |
| $$r\_{B}$$ | $$4.3$$ |
| $$δ\_{A},δ\_{B}$$ | $$0$$ |
| $$τ\_{noise}$$ | $$1$$ |
| $$σ$$ | $$1$$ |
| $ε$ for extrinsic noise | $$0.5$$ |
| $V$ for intrinsic noise | $$100$$ |
| B inhibits C, and the latter inhibits A |
| $$v\_{BC}$$ | $$3.1$$ |
| $$K\_{BC}$$ | $$1.26$$ |
| $$K\_{CA}$$ | the inverse of $1,5,10,20,30,30$, and $50$ |
| $$δ\_{C}$$ | $$10$$ |