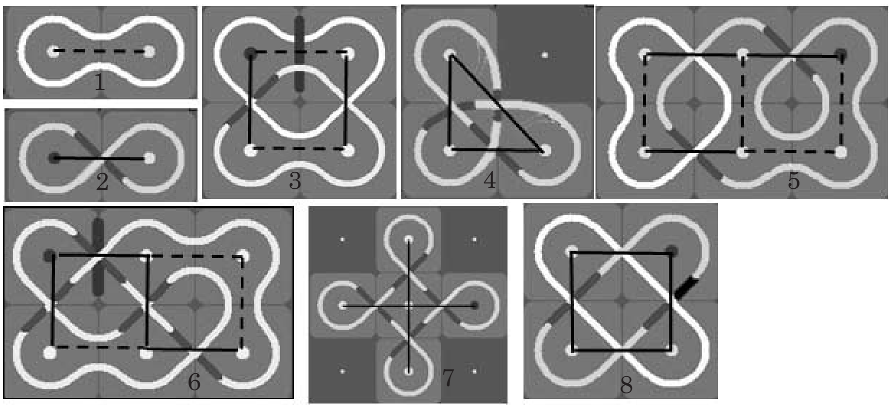
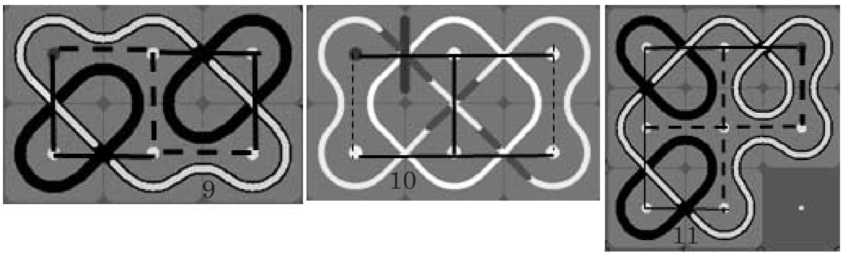
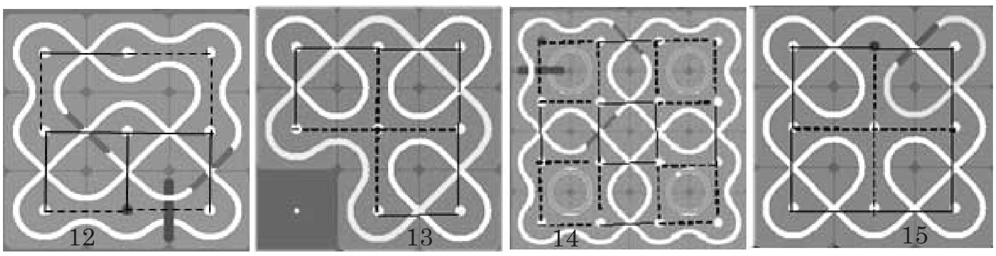


1: Unknot-with no edge (no crossing. Two-point connection Kolam) E = 0,
2: The infinity symbol, unknot E = 1, The edge in the graph G (N-line of this Kolam) is contracted to the graph (1). It corresponds to an untwisting or uncrossing Kolam.
3: Hopf Link E = 2, C = 2, 4: Trefoil Knot using diagonal crossings E = 3,
5: Link E = 3, C = 2, 6: Figure Eight Knot E = 4, 7: Unknot E = 4, 8: Link E = 4, C = 2



9: Link E = 4, C = 3, 10:Whitehead Link E = 4, C = 2, 11:Link E = 5. C = 3



12: Borromean Rings E=6, C=2, 13; Link E=6, C=4, 14: Link E=8, C=4, 15: Link E=8, C=5.

Fig. 2. Samples of relations between Kolam (L) and N-lines (G). Some patterns of the cases of the graph 1–19 are analyzed by the Tutte polynomial. Refer to Table 1 for the cases 1–15. The case 20 will be studied more for getting a formula in the future.

of the graph G, and C(L) is the component number of a knot-link L, the following relational equation is known:

$$T(G; -1, -1) = (-1) * *|E(G)| * (-2) * *(C(L) - 1),$$

where a medial graph of G is a knot-link L (a planar regular four-edge graph), as each vertex of the crossing points of Kolam has four edges of lines- and C(L) is the component number of L. |E| and C correspond to the crossing number and the loop number of a Kolam respectively.

According to the previous equation, the author calculated and confirmed the Tutte polynomial invariants T(G; −1,−1) of some Kolam patterns shown in Table 1. The component number C(L) is derived by reverse lookup from this table or it is derived from the following reserve equation.

$$\begin{aligned} C &= Log_{-2}(T(G; -1, -1)/(-1)^{|E(G)|}) + 1 \\ &= Log_2(|T(G; -1, -1)|) + 1. \end{aligned}$$