

## 32 Linear Recurrence Relations in Ribbon Quasai-Tree Subgraphs

(ID = KL18123602)

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### Abstract

We consider certain sequences of ribbon graphs, topological multigraphs where vertices are disks and edges are ribbons connecting these disks. Existing research has found that if you count those spanning subgraphs of graphs in these sequences with exactly one connected boundary component, you can find the Fibonacci numbers, the Lucas numbers, or other sequences with the same recurrence relation.

We expand upon earlier methods used, consider more sequences, and generalize by counting subgraphs with exactly  $n$  boundary components. By these methods we find more complex linear recurrence relations, and we discover that counting subgraphs with  $n + 1$  boundary components changes these relations in a predictable way.