Counting Bipartite Steinhaus Graphs

Steinhaus graphs are defined by $a_{i+1j+1} \equiv a_{ij} + a_{ij+1} \pmod 2$ for the upper triangle of the adjacency matrix. They have been studied since 1978. Dymacek (Discrete Mathematics 59, 1986, 9–20) has investigated the number $b(n)$ of bipartite Steinhaus graphs. He found the bounds $n + 1 \leq b(n) \leq 50 \cdot 2^{n-24}$.

We present a method to enumerate all bipartite Steinhaus graphs. This allows us to exhibit a relatively simple formula for $b(n)$. The value $b(n)$ fluctuates between two linear functions with different slopes greater than 2.

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