An Application of Graph Domination to Unfolding Polyhedra

Val Pinciu*, Southern Connecticut State University

We look at the domination number of the dual graphs of convex polyhedra, and use it to improve the best known results for a computational geometry problem known as the fewest nets problem.
A polyhedron can be cut by slicing along edges into connected flat non-overlapping pieces. Given a convex polyhedron with n vertices and F faces, the fewest nets problem asks to provide upper bounds for the number of pieces in terms of n and/or F.
We improve the previous best known bound of $F/2$ by proving that every convex polyhedron can be unfolded into no more than $3F/8$ non-overlapping nets. If the polyhedron is simplicial (every face is a triangle), the upper bound we obtain is $4F/11$. If the polyhedron is simple (every vertex has degree 3), the upper bound we obtain is $17F/53$.

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