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Boxicity of graphs on surfaces

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The boxicity of a graph $G=(V,E)$ is the least integer k for which there exist k interval graphs $G_i=(V,E_i)$, $1 \le i \le k$, such that $E=E_1 \cap ... \cap E_k$. Scheinerman proved in 1984 that outerplanar graphs have boxicity at most two and Thomassen proved in 1986 that planar graphs have boxicity at most three. In this note we prove that the boxicity of toroidal graphs is at most 7, and that the boxicity of graphs embeddable in a surface Σ of genus g is at most $5g+3$. This result yields improved bounds on the dimension of the adjacency poset of graphs on surfaces.

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