An upper bound on Wiener Indices of maximal planar graphs

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The Wiener index of a connected graph is the summation of distances between all unordered pairs of vertices of the graph. A maximal planar graph is a graph that can be embedded in the plane such that the boundary of each face (including the exterior face) is a triangle. Let G be a maximal planar graph of order $n \geq 3$. In this talk, we show that the diameter of G is at most $\lfloor \frac{1}{3}(n+1) \rfloor$, and the status of a vertex of G is at most $\lfloor \frac{1}{6}(n^2+n) \rfloor$. Both of them are sharp bounds and can be realized by an Apollonian network, which is a chordal maximal planar graph. We also present a sharp upper bound $\lfloor \frac{1}{18}(n^3+3n^2) \rfloor$ on Wiener indices when graphs in consideration are Apollonian networks of order $n \geq 3$ and conjecture that this bound also holds for all maximal planar graphs of order $n \geq 3$.

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