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Erratum to: 2-walks in 3-connected planar graphs

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Abstract

An error in the proof of the main theorem of our earlier paper in *Australas. J. Combin. 11 (1995), 117–122*, was pointed out by Henning Brühn. We correct this error.

We pick up the proof of Theorem 4 in [1] from the second to last paragraph of page 119.

We now extend $\hat{P}$ back to x. For each $\hat{K}$-bridge L in G, $L \cap K$ consists of at most one vertex, which we call $a(L)$. Let $\hat{L}$ be the bridge (if there is one) containing the path wCx. Because (G, C) is a circuit graph, this is the only $\hat{K}$-bridge in G that can have only two vertices of attachment. If $\hat{L}$ has only two vertices of attachment, then we shall do nothing with it; w will be its representative.

Let F' denote the union of xCu, all $\hat{K}$-bridges in G and all $\hat{P}$-bridges in K that contain a vertex $a(L)$ that is not in $\hat{P}$. Let $F = F' - \hat{P}$. Let $a_0, a_1, a_2, \ldots, a_r$ be the vertices x, u and the cut vertices of F that are in xCu, in the order they appear from x to u. Thus, $a_0 = x$ and $a_r = u$.

For each $i = 1, 2, \ldots, r$, either there is a path in F from a_{i-1} to a_i that is disjoint from $a_{i-1}Ca_i$ (except for their common ends) or there is not. If there is not, then a_{i-1} and a_i are consecutive vertices of xCu and we set Q_i to be the path $(a_{i-1}, a_{i-1}a_i, a_i)$ and $R_i = \emptyset$.

Let P be a path in F from a_{i-1} to a_i that is disjoint from $a_{i-1}Ca_i$ (except for common ends) and let H be the union of $a_{i-1}Ca_i$ and the $\{a_{i-1}, a_i\}$-bridge in F containing P. Let B be the block of H containing $a_{i-1}Ca_i$. If $H \neq B$, then B contains a unique cut vertex b of H. If $H = B$, then either H contains no $\hat{K}$-bridge L for which $a(L)$ is defined or, letting C_H denote the cycle bounding the outside face of H, there is a unique subpath P_H of C_H that: is disjoint from $a_{i-1}Ca_i$; has its ends adjacent to distinct vertices in $\hat{P}$; and has no internal vertex adjacent to a vertex of $\hat{P}$. Let b be any vertex of P_H.

Now let Q_i be a Tutte path in B from a_{i-1} to a_i through b, and let S_i be a SDR of the Q_i-bridges in B so that, if $a = x$, $a_{i-1} \notin S_i$, while if $a = u$, $a_i \notin S_i$.

The desired Tutte path Q for G is obtained by taking $\hat{P}$ and the union of all the Q_i, together with the edge uu_1. The SDR is the union of the SDR for $\hat{P}$ and the S_i. The only interesting Q-bridges are the ones that have vertices not in K and have attachments in $\hat{P}$. For example, if the H from two paragraphs above is not 2-connected, then there is a single Q-bridge M having three attachments, one being b and the other two being on $\hat{P}$. This is contained in a $\hat{P}$-bridge in K, and therefore has one of the two attachments on $\hat{P}$ as its representative.

If H is 2-connected, then each Q_i-bridge M in H is contained in a Q-bridge M' in G. If M' has an attachment that is not an attachment of M, then M has a vertex on the outside face of H and so has only two attachments on Q_i. The additional attachment is a vertex of $\hat{P}$, and the choice of b guarantees that there is only one such vertex. In this case, the representative for M' is the representative for M. □

References

[1] Z. Gao, R.B. Richter, and X. Yu, 2-walks in 3-connected planar graphs, Australasian J. Combin. **11** (1995), 117–122.

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