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Erratum

Erratum to "The lollipop graph is determined by its Q-spectrum"

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ABSTRACT

The proof of Theorem 3.3 in [Y. Zhang, X. Liu, B. Zhang, X. Yong, The lollipop graph is determined by its Q-spectrum, Discrete Math. 309 (2009) 3364–3369] is not correct. Actually, in the development of $P_{A(G_1)}(\lambda)$, the authors missed several products into addition, which makes the rest of the proof invalid. Note that the statement of the theorem is true. Here, we give a correct proof.

Theorem 3.3. *For no two non-isomorphic lollipop graphs, their corresponding line graphs have the same adjacency spectrum.*

Proof. By Lemma 2.12 of [1], $P_{A(G_1)}(\lambda)$ can be computed as follows:

$$P_{A(G_1)}(\lambda) = \lambda P_{A(P_{n-p_1-1})}(\lambda)P_{A(C_{p_1})}(\lambda) - (P_{A(C_{p_1})}(\lambda)P_{A(P_{n-p_1-2})}(\lambda) + 2P_{A(P_{n-p_1-1})}(\lambda)P_{A(P_{p_1-1})}(\lambda)) - 2(P_{A(P_{n-p_1-1})}(\lambda) + P_{A(P_{n-p_1-1})}(\lambda)P_{A(P_{p_1-2})}(\lambda)).$$

Then, by Lemma 2.11 of [1] and Maple, we have:

$$P_{A(G_1)}\left(t^{\frac{1}{2}} + t^{-\frac{1}{2}}\right) = -\frac{1}{\sqrt{t}(t-1)^2}(\psi_1(t) + \psi_2(t) + \psi_3(t) + \psi_4(t) + \psi_5(t) + \psi_6(t)), \text{ where}$$

$$\psi_1(t) = -t^{\frac{n}{2}+\frac{5}{2}} + 3t^{\frac{n}{2}+\frac{3}{2}} + 2t^{\frac{n}{2}+1},$$
$$\psi_2(t) = 2t^{-\frac{n}{2}+2} + 3t^{-\frac{n}{2}+\frac{3}{2}} - t^{-\frac{n}{2}+\frac{1}{2}},$$
$$\psi_3(t) = 2t^{\frac{n}{2}-\frac{p_1}{2}+\frac{5}{2}} + 2t^{\frac{n}{2}-\frac{p_1}{2}+2} - 2t^{\frac{n}{2}-\frac{p_1}{2}+\frac{3}{2}} - 2t^{\frac{n}{2}-\frac{p_1}{2}+1},$$
$$\psi_4(t) = -2t^{-\frac{n}{2}+\frac{p_1}{2}+2} - 2t^{-\frac{n}{2}+\frac{p_1}{2}+\frac{3}{2}} + 2t^{-\frac{n}{2}+\frac{p_1}{2}+1} + 2t^{-\frac{n}{2}+\frac{p_1}{2}+\frac{1}{2}},$$
$$\psi_5(t) = -t^{\frac{n}{2}-p_1+\frac{5}{2}} - 2t^{\frac{n}{2}-p_1+2} - t^{\frac{n}{2}-p_1+\frac{3}{2}},$$
$$\psi_6(t) = -t^{-\frac{n}{2}+p_1+\frac{3}{2}} - 2t^{-\frac{n}{2}+p_1+1} - t^{-\frac{n}{2}+p_1+\frac{1}{2}}.$$

Similarly, we obtain $P_{A(G_2)}\left(t^{\frac{1}{2}} + t^{-\frac{1}{2}}\right)$. Note that $P_{A(G_1)}\left(t^{\frac{1}{2}} + t^{-\frac{1}{2}}\right) = P_{A(G_2)}\left(t^{\frac{1}{2}} + t^{-\frac{1}{2}}\right)$. Now, by comparing the largest terms, $p_1 = p_2$ and so H_{n,p_1} and H_{n,p_2} are isomorphic. □

References

[1] Y. Zhang, X. Liu, B. Zhang, X. Yong, The lollipop graph is determined by its Q-spectrum, Discrete Math. 309 (2009) 3364–3369.

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