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Erratum For 'A Bound on the Number of Edges in Graphs Without an Even Cycle'

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Due to a calculation error, the constant in the main theorem is not $80\sqrt{k\log k}$ but $80\sqrt{k}\log k$. The error was discovered by Xizhi Liu.

For a new discussion on the limit of the method used in this paper see the revised arXiv version of the paper.

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Error. On page 13 of [1], in the last line of the proof of inequality (4.5) it is asserted that (3.1e) is a consequence of (4.1). The assertion is unsubstantiated. To fix the argument one must make two changes. First, in Theorem 1.2 one needs to replace the assumption $d \geqslant 20\sqrt{k\log k}\cdot n^{1/k}$ by $d \geqslant (20\sqrt{k}\log k)n^{1/k}$. Second, one needs to weaken (4.5) to

$$|V_{i+1}| \geqslant \frac{d^2}{400k\log^2 k}|V_{i-1}|. \tag{4.5}$$

With these changes, the proof works. Indeed, if (3.1e) fails, then

$$e(V_{i-1},V_i) \leqslant 20(2\log k+1)^2|V_i| \overset{(4.4)}{\leqslant} 20(2\log k+1)^2\frac{2k}{d}|V_{i+1}| \leqslant 360\frac{k\log^2 k}{d}|V_{i+1}|.$$

This inequality and (4.1) then together imply (4.5).

If k is even, $k/2$ applications of (4.5) yield

$$|V_k| \geqslant \frac{d^k}{(400k\log^2 k)^{k/2}}.$$

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If k is odd, $(k-1)/2$ applications of (4.5) yield

$$|V_k| \geqslant \frac{d^{k-1}}{(400k\log^2 k)^{(k-1)/2}}|V_1| \geqslant \frac{d^k}{(400k\log^2 k)^{(k-1)/2}}.$$

Either way, since $|V_k| < n$ we conclude that $d \leqslant (20\sqrt{k}\log k)n^{1/k}$.

Reference

[1] Bukh, B. and Jiang, Z. (2017) A bound on the number of edges in graphs without an even cycle. *Combin. Probab. Comput.* **26** 1–15. arXiv:1403.1601

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