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On Zudilin's q-question about Schmidt's problem

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For any integer $r\geqslant 2$, using the q-Pfaff-Saalsch\"utz identity, we prove that there exists a (unique) sequence of Laurent polynomials $\{b^{(r)}_k(q)\}_{k=0}^\infty$ in q with nonnegative integral coefficients such that \sum_{k=0}^n q^{-rnk} {n\brack k}^r {n+k\brack k}^r =\sum_{k=0}^n q^{-nk} {n\brack k}{n+k\brack k}b^{(r)}_k(q), where ${n\brack k}$ denotes the q-binomial coefficient. This gives a new solution to Zudilin's question about finding a q-analogue of Schmidt's problem.

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