$$|\tilde{D}| = \left[|P_1 P_4 - P_2 P_3| + |q_1 q_4 - q_2 q_3| \right] / 2$$

$$+ \left[|P_1 - q_1| + |P_2 - q_2| + |q_3 - P_3| + |P_4 - q_4| \right] / 8$$

$$\Rightarrow \quad |\tilde{D}| \in [0, \tfrac{1}{4}]$$

$$\tilde{\pi}^2 = \frac{\tilde{D}^2}{2 \cdot \left[(P_1 + P_2)(P_1 + P_3)(P_2 + P_4)(P_3 + P_4) + (q_1 - q_2)(q_1 + q_3)(q_1 + q_4)(q_3 + q_4) \right]}$$