

The normalization constant is $N_0 = N_1 \sqrt{\frac{2n}{3}} \sqrt{\frac{1}{8n^2}}$.

This yields the spectrum

$$P(w) = \frac{1}{N_0} \left[\sum_{n=0}^N \frac{w \sin nw \sin(N+n)w}{n(1^2 - w^2)^2} \right]^2 \quad (A4)$$