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An Integral Inequality Bounding the Autocorrelation of a Pulse or Sequence at a Known Lag

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Abstract:

This paper gives best bounds for the ratio

$$\int_a^{b-t} f(x) f(x+t) dx / \int_a^b f^2(x) dx$$
 for any square-summable real

function $f(x)$ on the interval $(a, b]$. Similarly, bounds are established for

the autocorrelation of any pulse or finite-length sequence at any known lag, and the family of pulses and sequences attaining these bounds is identified. The form of this family is related to a half-cycle of a sinusoid. Stronger bounds are suggested for pulses known to be non-negative and unimodal or concave.



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