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A strengthening of the Nyman-Beurling criterion for the Riemann hypothesis. (English)

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Let $\rho(x) = x - [x]$ be the fractional part of x , and χ the characteristic function of the interval $(0, 1]$. Also let H be the Hilbert space $L_2((0, \infty), dx)$. Let B be the subspace of Beurling functions which are defined to be the linear hull of the family $\{\rho_a : 1 \leq a \in R\}$ with $\rho_a(x) = \rho(1/ax)$. Let B^{nat} be the subspace generated by $\{\rho_a : a \in N\}$. The Nyman-Beurling criterion states that the Riemann hypothesis is equivalent to the assertion that $\chi \in \overline{B}$. In this paper, the author proves that the Riemann hypothesis is equivalent to the statement that $\chi \in \overline{B^{nat}}$.

Reviewer: [Jianya Liu \(Jinan\)](#)

MSC:

11M26 Nonreal zeros of $\zeta(s)$ and $L(s, \chi)$; Riemann and other hypotheses

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Riemann zeta function; Riemann hypothesis; Nyman-Beurling theorem