Spectral theory of the truncated Fourier operator

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The truncated Fourier operator $\mathfrak{F}_{\mathbb{R}_+}$ acts in the space $L^2(\mathbb{R}_+)$ and is an operator of the form

$$\mathfrak{F}_{\mathbb{R}_+} = P\mathfrak{F}P,$$

where $\mathfrak{F}$ is the Fourier-Plancherel operator (acting in $L^2(\mathbb{R})$) and P is the natural projector from $L^2(\mathbb{R})$ onto $L^2(\mathbb{R}_+)$.

The spectral theory of the operator $\mathfrak{F}_{\mathbb{R}_+}$ and the appropriate functional calculus are developed.