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The norm of an infinite L-matrix

We know that any linear application from $\mathbb{C}^n$ to $\mathbb{C}^n$ can be described with an $n \times n$ square matrix. The space ℓ^2 of square-summable sequences indexed by the natural numbers is a generalization of $\mathbb{C}^n$ to infinite dimension. We find that the operators, in the case of ℓ^2, can be described by infinite matrices. However, not all infinite matrices gives us an operator on ℓ^2. It is natural to wonder which infinite matrices are a representation of an operator on ℓ^2, and what is their norm. Because of their applications in the problem of the caracterisation of the multipliers in the weighted Dirichlet spaces, we restrict ourselves to the case of infinite L-matrices. An infinite positive L-matrix is an infinite matrix which is defined by a sequence $(a_n)_{n\geq 0}$ of positive real numbers and which is of the form

$$A = \begin{pmatrix} a_0 & a_1 & a_2 & a_3 & \cdots \\ a_1 & a_1 & a_2 & a_3 & \cdots \\ a_2 & a_2 & a_2 & a_3 & \cdots \\ a_3 & a_3 & a_3 & a_3 & \cdots \\ \vdots & \vdots & \vdots & \vdots & \ddots \end{pmatrix}.$$

We will use the Schur test to find some conditions on the sequence $(a_n)_{n\geq 0}$ for A to be an operator on ℓ^2 and to find an upper bound on the ℓ^2 norm of A. Moreover, we will use these tools to find the exact norm of a particular set of L-matrices.