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8. Analysis

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On a Tauberian Theorem of G. M. Petersen for Abel summability

Let $E = \{\underline{s} = (s_n)_{n\geq 0} : s_n - s_{n-1} = o(n^{-1})\}$, where $\underline{s}$ is a sequence of complex numbers. Using the sup norm topology, G. M. Petersen in 1979 defined a type of closure H for E and proved that membership in H is a Tauberian condition for Abel summability. Since E contains unbounded sequences, we define a new norm on E, and using the FK-topology on $E+l^\infty$, we show that $H = \bar{E}^{E+l^\infty}$ and give an alternative proof of Petersen's result. Also, we give some results for $\Omega(r)$, the set of all oscillating sequences. E. g., membership in $\Omega(r)$ is a Tauberian condition for Abel summability if and only if there exists a positive integer k such that $\lim_{n\to\infty} \inf \frac{r_{n+k}}{r_n} > 1$.

References: A. J. Badiozzaman and B. Thorpe, Some best possible Tauberian results for Abel and Cesaro summability II, J. London Math. Soc. (2) 53 (1996), 529–538.