

ON ABEL SUMMABILITY OF JACOBI POLYNOMIALS SERIES, THE WATSON KERNEL AND APPLICATIONS

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In this paper we return to the study of the Watson kernel for the Abel summability of Jacobi polynomial series. These estimates have been studied for over more than 40 years. The main innovations are in the techniques used to get the estimates that allow us to handle the cases $0 < \alpha$ as well as $-1 < \alpha < 0$, with essentially the same methods. We use integral superpositions of Natanson kernels and A.P. Caldern and Muckenhoupt A_p -weight theory. We consider a generalization of a theorem due to Zygmund in the context to Borel measures. The proofs are different from the ones given in previous works. We will also discuss in detail the Calderón-Zygmund decomposition for non-atomic Borel measures in \mathbb{R} . Then, we prove that the Jacobi measure is doubling and therefore, following Calderón's paper, we study the corresponding A_p weight theory in the setting of Jacobi expansions, considering power weights of the form $(1 - x)^{\bar{\alpha}}$, $(1 + x)^{\bar{\beta}}$, $-1 < \bar{\alpha} < 0$, $-1 < \bar{\beta} < 0$. Finally, as an application of the weight theory we obtain L^p estimates for the maximal operator of Abel summability of Jacobi function expansions for suitable values of p .

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