Abstract

The present thesis entitled "**Algebras of block Toeplitz matrices and matrix valued truncated Toeplitz operators and related problems**" includes a part of research work carried out by the author during the last four years at the Abdus Salam school of Mathematical sciences Government college university Lahore Pakistan and Simion Stoilow Insitute of the Mathematics of the Romania Academy Bucharest Romania. The thesis comprises five chapters and each chapter is subdivided into various sections.

The maximal algebras of scalar Toeplitz matrices are known to be formed by generalized circulants. A similar simple description cannot be obtained for block Toeplitz matrices. The identification of algebras consisting of block Toeplitz matrices is a harder problem, that has received little attention up to now. We consider the case when the block entries of the matrices belong to a commutative algebra $\mathcal{A}$. We introduce and investigate certain families of maximal commutative algebras of block Toeplitz matrices. After obtaining some general results, we classify all the maximal algebras for certain particular cases of $\mathcal{A}$.

In the last decade, a large amount of research has concentrated on a generalization of Toeplitz matrices, namely truncated Toeplitz operators. For matrix valued truncated Toeplitz operators, which are compressions of multiplication operators to model subspaces of the vector valued Hardy space $H^2(E)$, likewise block Toeplitz matrices case the problem of charactarizing the maximal algebras becomes now very hard and there seem to be no chances to treat it in a general way. However, under certain assumptions we obtain criteria for commutation relations for matrix valued

truncated Toeplitz operators. The results show an analogy to the case of Toeplitz matrices which will be the basis for extension of Sedlock classes of truncated Toeplitz operators to matrix valued case.