In this thesis we observed different approaches to construct a preconditioner for symmetric interval matrices. Using these preconditioners we described and implemented methods for testing regularity of these matrices and compared efficiency of described algorithms. After that we observed different methods for estimating eigenvalues of this class of matrices. Also we constructed such method that uses any testing regularity method for filtering an input interval. After that we compared efficency of these methods on different classes of matrices. All algorithms we implemented using MATLAB with the IntLab library. Comparing numerical results we concluded that the way to test regularity of symmetric interval matrix based on the sufficient condition for regularity with standard preconditioner is the most efficient one among the algorithms we implemented. The constructed method for estimating eigenvalues based on testing regularity gives very accurate result because of its iterativity, but it seems to be very slow comparing to other methods which give similar accuracy.