1046-62-797   **Abbas M. Alhakim*** (`aalhakim@clarkson.edu`), 8 Clarkson Avenue, Science Center 5815, Potsdam, NY 13699. *A Spectral Look at the Serial test of Randomness.* Preliminary report.

The overlapping serial test of randomness collects statistics from a sequence of values from a finite set by observing the overlapping blocks of two consecutive pre-specified sizes. We give a version of this test with a chi-square statistic having much lower degrees of freedom. This is based on the spectral properties of the limiting covariance matrix of the counts of overlapping blocks. In particular, the information gained by incrementing the block size by one unit is seen to be solely conveyed by the eigenvectors of the lowest nonzero eigenvalue, which are thus used to construct the proposed chi square statistic. Better still, these eigenvectors are further split according to their symmetries into two sets that reveal two different attributes of the underlying sequence being tested, for uniformly distributed sequences. We also demonstrate this by simulation. (Received September 11, 2008)