Event history and spectral algorithms in monitoring of change in level of stability of dynamic systems - comparison of methods

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There are two approach to the examination of change in level of stability of dynamic systems of different nature. The first one is based upon analysis of sequence of events occurring through time. This approch is typical of algorithms used in earthqkuake prognosis. These algorithms uses indications of origin of cascades of pwer-law activity and/or change in time recurrence of events of different size.

The second approach is typical of the examination of uniform time series and is based upon spectral analysis methods. The spectral approach uses the indicators of change in relative involvement of spectral domains of different frequency. Such approach was applied to a number of time series characterizing the change of different parameters obtained in geophysical monitoring and in examination of finamcial time series. In majority of cases it was shown that the relative input of low frequency variations have a tendency to increase before the strong change in values of time seriers under examination. This little but statistically valid effect is similar to that taking place in vicinity of bifurcation points (including phase transitions and a number of similar situations). Such critical slowing-down-like features were found to occur in the evolution of systems of very different nature approaching some instability in their behavior, i.e.,for the systems nearby jumps occurrence. One of the problem is to compare these two different approaches. The detailed catalogs of earthquakes give possibility to carry out these types of examination. The results of such comparison are discussed.