

Beam with Unequal Bunches versus a Wide-Band Impedance in a Synchrotron: Stability Criterion,
S. IVANOV, M. POZDEEV, IHEP, Protvino - The paper expounds a technique to find a sufficient condition of (transverse, longitudinal) stability of a beam with unequal bunches, partial orbit filling or bunch trains included. It proceeds from a computer solution of eigenvalue problems of a moderate dimension for an observable within-bunch motion (multipoles, their higher-order radial modes) at a given normal coupled-bunch mode of a conventional basic beam -- a closed train of identical and equispaced bunches. Then, its complex eigenvalues and non-diagonal Gram matrices of eigenvectors are used to find boundary of a convex field of complex Rayleigh-Ritz ratios which yield an 'upper' estimate of eigenvalue loci and, thus, stability safety margins for any arbitrary beam which is a subset of the basic one. As an example of application, the technique is applied to transverse resistive-wall head-tail instability of bunches in the UNK.