Properties of the extremal flow on Barabanov spheres

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The problem of uniform stability of (linear) switched systems can be reformulated as a problem of identification of the "most unstable trajectory" of the system. This problem can be easily solved for two-dimensional systems through the Jordan theorem, but turns out to be extremely difficult starting from dimension three. Thanks to Barabanov results the study of the most unstable dynamics is reduced to the study of certain dynamics on a manifold which is homeomorphic to a sphere (Barabanov sphere). In this talk I will discuss some results and open questions concerning such dynamics and the geometry of Barabanov spheres. In particular I will focus on recent results in the three-dimensional case with only two available modes, when the difference between the two corresponding matrices is a rank one matrix.