ODTU-Bilkent Algebraic Geometry

p-adic Integration Theories on Curves

By

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Abstract: For curves over the field of p-adic numbers, there are two notions of p-adic integration: Berkovich-Coleman integrals which can be performed locally, and Vologodsky integrals with desirable number-theoretic properties. These integrals have the advantage of being insensitive to the reduction type at p, but are known to coincide with Coleman integrals in the case of good reduction. Moreover, there are practical algorithms available to compute Coleman integrals.

Berkovich-Coleman and Vologodsky integrals, however, differ in general. In this talk, we give a formula for passing between them. To do so, we use combinatorial ideas informed by tropical geometry. We also introduce algorithms for computing Berkovich-Coleman and Vologodsky integrals on hyperelliptic curves of bad reduction. By covering such a curve by certain open spaces, we reduce the computation of Berkovich-Coleman integrals to the known algorithms on hyperelliptic curves of good reduction. We then convert the Berkovich-Coleman integrals into Vologodsky integrals using our formula. We illustrate our algorithm with a numerical example.

This talk is partly based on joint work with Eric Katz from the Ohio State University

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Place: Zoom

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