

# New insight into Mihailo Petrovic's dissertation

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Mihailo Petrovic's dissertation was submitted to the Ecole Normale Superieure and approved in 1894, by the commission consisting of Hermite, Picard and Painleve. Many articles have been written since about the dissertation and its results and on Petrovic's influence on mathematics in Serbia. However, there has been no substantial analysis of Petrovic's methods. The present work is trying to change this attitude. Petrovic's methods were based primarily on the so called Newton polygon. First described in Newton's letter to Oldenburg, dated October 26th, 1676, the method has been forgotten and much later widely used in the work of Puiseux around 1850's, and then forgotten again for a long time. It has revived in the work of the school of V. I. Arnold. The main idea of the method is to treat qualitative behavior of polynomials (in Petrovic's case polynomials in two variables  $y, y'$  with functional coefficients  $\phi(x)$ ) by the combinatorial geometry of the convex hull of the points representing its exponents. The second part of Petrovic's dissertation is devoted to the generalisation of his plane results (first order ODE) to higher order ODE. He tried to obtain results by the new planar version of the Newton polygon. The work of Arnold and his school, and also of the author, has showed how to use higher dimensional polyhedra instead of polygons. In this case, it would be the right way to generalise Petrovic's results for the first order ODE. This work is developing this idea further.

## References

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