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On the rationality of Igusa zeta functions of some classes of polynomials

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Abstract - In this paper we give an alternative self-contained proof for the rationality of the Igusa zeta functions of some classes of polynomials in two variables with coefficients in a non-archimedean local field of arbitrary characteristic, by describing explicitly the associated Igusa zeta functions. As a consequence, for characteristic zero, we obtain an elementary proof of Igusa's conjecture relating the poles of the Igusa zeta functions of a polynomial F and one of the fundamental invariants of the singularities of F , the Bernstein-Sato polynomial b_F . In addition, we determine the number of successive applications of the Stationary Phase Formula for computing the Igusa zeta functions of considered classes of polynomials. In the general case, this is an open problem.

Key words and phrases : Igusa zeta functions, rationality in positive characteristic, Igusa's conjecture.

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