1079-33-432 **Emma Previato*** (ep@bu.edu), Department of Mathematics and Statistics, Boston University, Boston, MA 02215-2411. *Heat equations for the higher-genus sigma function.*

Riemann's ϑ-function is a fundamental heat solution:

$$\frac{\partial^2\vartheta}{\partial z_i \partial z_j} = 2\pi\imath(1+\delta_{ij})\frac{\partial\vartheta}{\partial\tau_{ij}}.$$

Klein generalized Weierstrass' σ to a modular invariant, expandable in weighted abelian coordinates $\vec{u}$ corresponding to jet bundles on the curve in its Jacobian. V.M. Bukhstaber and D.V. Leĭkin derived heat equations (HE) for σ w.r.t. parameters λ_j of the curve. In genus 2 they showed equivalence with physics equations as Chazy. With coauthors and current *Maple* program we produce the $(\vec{u}, \lambda)$ HE satisfied by $\sigma(u_1, u_2, u_3)$ for the genus 3 curve $y^3 = x^4 + \lambda_3 x^3 + \lambda_2 x^2 + \lambda_1 x + \lambda_0$,

$$d_i \frac{\partial}{\partial\lambda_i}\sigma = \left[\sum_{j,k=1\ldots g}\left(a_j a_k u_j u_k + b_j^k u_j \frac{\partial}{\partial u_k} + c_{jk}\frac{\partial}{\partial u_j}\frac{\partial}{\partial u_k}\right)\right]\sigma,$$

$i = 0\ldots 3$, $d_i, a_{jk}, b_{jk}, c_{jk}$ polynomials in the λ_ℓ. We will discuss computational and theoretical challenges, as interpreting these equations in terms of the Gauss-Manin connection. (Received January 18, 2012)