64. On the Isomonodromic Deformation of a Linear Ordinary Differential Equation of the Third Order

By Hironobu KIMURA
Department of Mathematics, University of Tokyo

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§1. **Introduction.** Consider a third order linear ordinary differential equation of Fuchsian type

$$\frac{d^3y}{dx^3}+p_1\frac{d^2y}{dx^2}+p_2\frac{dy}{dx}+p_3y=0 \tag{1.1}$$

with the following Riemannian scheme:

$$\left\{\begin{matrix} x=0 & x=1 & x=t & x=\lambda_j & x=\infty \\ \alpha_0 & \alpha_1 & \beta & \gamma_j & \alpha_\infty \\ \alpha_0+\kappa_0 & \alpha_1+\kappa_1 & \beta+\theta & \gamma_j+2 & \alpha_\infty+\kappa_\infty \\ \alpha_0+\kappa_0' & \alpha_1+\kappa_1' & \beta+\theta' & \gamma_j+3 & \alpha_\infty+\kappa_\infty' \end{matrix}\right\} \tag{1.2}$$
$$(j=1,2,3,4)$$

and we suppose that *the singularities* $x=\lambda_j$ $(j=1,2,3,4)$ *are non-logarithmic ones and the characteristic exponents at each singular point do not differ by integer.*

The purpose of this paper is to derive a system of isomonodromic deformation equations of (1.1) regarding t as deformation parameter.

§2. **Hamiltonian system attached to (1.1).** The coefficients $p_j(x)$ $(j=1,2,3)$ of the equation (1.1) are given by

$$p_1(x)=\frac{a_0^1}{x}+\frac{a_1^1}{x-1}+\frac{b^1}{x-t}+\sum_{k=1}^4\frac{c_k^1}{x-\lambda_k},$$

$$p_2(x)=\frac{a_0^2}{x^2}+\frac{a_1^2}{(x-1)^2}+\frac{b^2}{(x-t)^2}+\sum_{k=1}^4\frac{c_k^2}{(x-\lambda_k)^2}$$
$$+\frac{a_\infty^2}{x(x-1)}-\frac{t(t-1)H}{x(x-1)(x-t)}+\sum_{k=1}^4\frac{\lambda_k(\lambda_k-1)\mu_k}{x(x-1)(x-\lambda_k)},$$

$$p_3(x)=\frac{a_0^3}{x^3}+\frac{a_1^3}{(x-1)^3}+\frac{b^3}{(x-t)^3}+\sum_{k=1}^4\frac{c_k^3}{(x-\lambda_k)^3}$$
$$+\frac{1}{T(x)}\left[a_\infty^3+\eta_0\frac{t}{x}-\eta_1\frac{t-1}{x-1}+\eta_t\frac{t(t-1)}{x-t}\right.$$
$$\left.+\sum_{k=1}^4\left\{\frac{T(\lambda_k)}{(x-\lambda_k)^2}+\frac{T'(\lambda_k)}{x-\lambda_k}\right\}\xi_k+\sum_{k=1}^4\frac{\zeta_k}{x-\lambda_k}\right],$$

where

$$T(x)=x(x-1)(x-t)$$

and a_Δ^i, b^i, c_k^i $(i=1,2,3;\ k=1,2,3,4;\ \Delta=0,1,\infty)$ are constants de-