

# Connection problem for the isomonodromic tau-function of the Sine-Gordon reduction of Painlevé-III equation

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We evaluate explicitly, in terms of the Cauchy data, the constant pre-factor in the large  $x$  asymptotics of the Painlevé III tau-function. Our result proves the conjectural formula for this pre-factor obtained recently by A. Its, O. Lysovyy and Yu. Tykhyy. We use Malgrange-Bertola extension of Jimbo-Miwa-Ueno differential form to figure out dependence of tau-function on monodromy data. As byproduct of our calculations, we showed that logarithm of tau-function coincides with classical action up to elementary terms. The constant pre-factor is essentially the generating function of canonical transformation between coordinates at zero and coordinates at infinity.

*This is the joint work with Alexander Its.*

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