

# T, Q and periods in SU(3) N=2 SYM

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We consider the third order differential equation derived from the deformed Seiberg-Witten differential for pure  $calN = 2$  SYM with gauge group  $SU(3)$  in Nekrasov-Shatashvili limit of  $\Omega$ -background. We show that this is the same differential equation that emerges in the context of Ordinary Differential Equation/Integrable Models (ODE/IM) correspondence for  $2d A_2$  Toda CFT with central charge  $c = 98$ . We derive the corresponding  $QQ$  and related  $TQ$  functional relations and establish the asymptotic behaviour of  $Q$  and  $T$  functions at small instanton parameter  $q \rightarrow 0$ . Moreover, numerical integration of the Floquet monodromy matrix of the differential equation leads to evaluation of the  $A$ -cycles  $a_{1,2,3}$  at any point of the moduli space of vacua parametrised by the vector multiplet scalar VEVs  $\langle \text{tr } \phi^2 \rangle$  and  $\langle \text{tr } \phi^3 \rangle$  even for large values of  $q$  which are well beyond the reach of instanton calculus. The numerical results at small  $q$  are in excellent agreement with instanton calculation. We conjecture a very simple relation between Baxter's  $T$ -function and  $A$ -cycle periods  $a_{1,2,3}$ , which is an extension of Alexei Zamolodchikov's conjecture about Mathieu equation.

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