

1152-35-180

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Estimates of bubbling solutions of $SU(3)$ Toda systems at critical parameters-Part 1.

For regular $SU(3)$ Toda systems defined on Riemann surface, we initiate the study of bubbling solutions if parameters (ρ_1^k, ρ_2^k) are both tending to critical positions: $(\rho_1^k, \rho_2^k) \rightarrow (4\pi, 4\pi N)$ or $(4\pi N, 4\pi)$ ($N > 0$ is an integer). We prove that there are at most three formations of bubbling profiles, and for each formation we identify leading terms of $\rho_1^k - 4\pi$ and $\rho_2^k - 4\pi N$, locations of blowup points and comparison of bubbling heights with sharp precision. The results of this article will be used as substantial tools for a number of degree counting theorems, critical point at infinity theory in the future. (Received September 03, 2019)