

Recently it is shown that four-dimensional gluon scattering amplitudes at strong coupling correspond to minimal area surfaces in AdS_3 space circumvented by light-like segments [1]. In this article, a new method to calculate the minimal surfaces in AdS space of arbitrary dimension is developed. It is known that the calculation can be reduced to the problem of generalized sinh-Gordon (or Toda) equations for the AdS_3 case. The authors here present a series method to the solutions of these generalized integrable equations and give explicit results for dimension 3 and 4. The series method is based on a calculational technique developed for the dynamics of solitons [2]. In the case of AdS_3 , the result is in excellent agreement with the known result numerically. The new method is expected to be useful to reveal the correspondence between scattering amplitudes and minimal surfaces in all regimes including a weak-coupling limit.

References

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- [2] N. S. Manton, “An Effective Lagrangian For Solitons,” *Nucl. Phys. B* **150** (1979) 397.