

Analytic approach to three-neutrino oscillations in the Earth

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“Using the Magnus expansion of the evolution operator in the adiabatic basis, we find an approximate solution to the problem of three-neutrino oscillations in a medium with a symmetric, but otherwise arbitrary, density profile. The evolution operator of the system is written as the product of factors corresponding to effective two-neutrino problems for a low and a high energy regime.

By virtue of such factorization the approximation works well over a wide range of energies. In the case of atmospheric neutrinos traversing the Earth, the oscillation probabilities calculated using our approach are in good agreement with the results of numerical calculations.”

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