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Diffusion matrix associated with the diffusion processes of multiple conserved charges in a hot and dense hadronic matter

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Bulk matter produced in heavy ion collisions has multiple conserved quantum numbers like baryon number, strangeness and electric charge. The diffusion process of these charges can be described by a diffusion matrix describing the interdependence of diffusion of different charges. The diffusion coefficient matrix is estimated here from the Boltzmann kinetic theory for the hadronic phase within relaxation time approximation. In the derivation for the same, we impose the Landau-Lifshitz conditions of fit. This leads to e.g. the diagonal diffusion coefficients to be manifestly positive definite. The explicit calculations are performed within the ambit of hadron resonance gas model with and without excluded volume corrections. It is seen that the off-diagonal components can be significant to affect the charge diffusion in a fluid with multiple conserved charges. The excluded volume correction effects is seen to be not significant in the estimation of the elements of the diffusion matrix.

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