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Geodesic deviation in Kundt spacetimes of any dimension

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Using the invariant form of equation of geodesic deviation, that describes relative motion of free test particles, we investigate a completely general family of D-dimensional Kundt spacetimes. We demonstrate that local influence of the gravitational field can be naturally decomposed into Newton-type tidal effects typical for type II spacetimes, longitudinal deformations mainly present in spacetimes of algebraic type III, and type N purely transverse effects corresponding to gravitational waves with $D(D-3)/2$ independent polarization states. We also explicitly study the most important examples, namely exact pp-waves, gyratons, and VSI spacetimes. This analysis helps us to clarify the geometrical and physical interpretation of the Kundt class of nonexpanding, nontwisting, and shearfree geometries.