We summarize methods of construction of spacetimes with nonexpanding impulsive waves, limit case of Kundt family and gyratonic spacetimes respectively, and $\mathcal{C}^1$-matching procedure leading to refraction formulae of geodesic motion crossing the impulsive hypersurfaces. Next we conduct a physical analysis and a visualisation of geodesic motion for selected cases of spacetimes of our interest. As a part of this work we created a Python programming language package *GRImpulsiveWaves* for interactive visualisation of geodesic motion based on refraction formulae.