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Penrose's conformal compactification and asymptotic analysis

In the 1960's, Roger Penrose introduced a remarkable geometric tool for understanding the asymptotic behaviour of fields in certain types of spacetimes: the conformal compactification. We will start with the simplest situation of all, Minkowski spacetime describing a flat empty universe. We shall present in details the conformal compactification and the embedding into the Einstein cylinder, all done with simple explicit calculations. Then we will use this geometrical transformation to obtain information about the behaviour of scalar fields (solutions of the wave equation) along different types of curves escaping to infinity. Eventually we shall touch on more present questions on curved spacetimes.