

In the present work we investigate the impact of weak gravitational wave in the linearized theory of gravity on a simple model of an interferometric gravitational wave detector, whose individual parts (mirrors, and electromagnetic field) are idealised by free test particles.

After a necessary, fairly popularly conceived introduction to gravitational wave theory in the linearized gravity, the astrophysical sources of the gravitational waves, the possibilities of their detection and the principles of the detectors, we provide a mathematical survey of the indispensable parts of general relativity and of the linearized theory of gravity. After that, we finally deal with the model itself. In the linear approximation with respect to the perturbations, we solve the equations of motion of the individual components and derive the detector response to a gravitational wave. Finally, we present a few comments, including a proof of gauge invariance of the derived formula.