

Superposition Principle

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Superposition

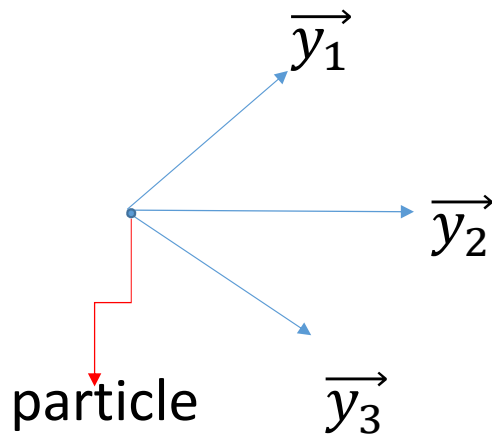


Fig.1 : individual displacements



Fig.2 : net displacement

What is the principle of superposition of waves?

- If the medium is disturbed by more than one wave, then the resultant displacement of a particle of the medium is given by the vector sum of the individual displacements of the particle due to all the waves.

Let $\vec{y}_1, \vec{y}_2, \vec{y}_3, \dots$ be the individual displacements due to the individual waves. Then according to the principle of superposition of waves, the net displacement will be

$$\vec{Y} = \vec{y}_1 + \vec{y}_2 + \vec{y}_3 + \dots$$

Linearity

- In instrumentation, linearity means that a given change in an input variable gives the same change in the output of the measurement. This is highly desirable in scientific work. In general, instruments are close to linear over a certain range, and most useful within that range.

Does linearity require superposition?

- Superposition is an important principle when dealing with linear networks, and can be used to make analysis easier. If a network has multiple independent sources, it is possible to find the response to each source separately, then add up all of the responses to find total response.

Thank You