hecture I Physical Optics Chapter 1: Jsterference of Two Beams of Light 1–1: Hygens Principle: When waves pass through an aperture, or past the edge of an obstacle,they always spread to some extent into the region which is not directly exposed to the oncoming waves. This phenomenon is called diffraction. In order to explain the bebending of light, Higgon's nearly ttree centuries ago proposed the rule that each point on a wave frout may be regarded as a new source of waves. This principle has very far–reaching applications and wil be used later in discussing the diffraction of light, but we shell Cousider hore ouly avery simple proof of its correctness. In this Fiqure A let a set of plane waves approach the barrier AB from the left, and let the barrier centain an opening S of width somewhat smaller then the wavelength. At all points except 5 the waves will be either reflected or absorbed, but S' wil be free to produce a disturbance behind the Screen.It is found experimentally, in agreement with the above prenciple,that the waves spread out from s'in the form of semicircles. Huygen's principle as shown in Fig. I can be illustrated very suceessfully with water waves. An cure lamp on the floor, with aglass bottomed tray ofr tank above it, will cast shadows of waves on a wwhite ceiling. If the experiment in frig.t be performed. with light, one would naturally expect, from the fact that light generally travels in straight lines, that merely a narrow patch of loght would appear at D. Howerer if the slit is made very narrow, an appreciable broading of this pateh is observed, its breadth increasing as the slit is further narrowed. This remarkable evidence that light does not always travel in straight line was mentioned at the very beginning of this section. when the screen CE is replaced by photographic plate,the light is most intense in the forward direction, but its intensity decreases slowly as the angleincreases.If the slit is small coCompared with the wavelength of light, the intensity does not come to Zero even when the angle of observation becomes 90. 1.2: Young's Experiment. The original experiment perfermed by Young is shown in Fiqure 2), Sunlight was first allowed to pass througha pinhle I and then,at a considerable distance away,through two pinhole S, and S. The two sets of spherrical waves emerging from the two holes inter fered with each other in such a way as to form a symmetrical pattern of vorying intensity on the screen AC. Since this carly experiment was performed,it has been found convenient to replace the pinholes by narrow slits and to use a source giving monochromatic light,ie., light of a single waveleng th. .In place of spherical wave fronts, represented equally well in two dimensions by the same fiqure (2

lakhasly.com © تم تلخيص النص بواسطة موقع لخصلي