

PHYSICAL OPTICS.

CHAPTER X.

PRELUDE TO THE EPOCH OF YOUNG AND FRESNEL.

BY *Physical Optics* we mean, as has already been stated, the theories which explain optical phenomena on mechanical principles. No such explanation could be given till true mechanical principles had been obtained; and, accordingly, we must date the commencement of the essays towards physical optics from Descartes, the founder of the modern mechanical philosophy. His hypothesis concerning light is, that it consists of small particles emitted by the luminous body. He compares these particles to balls, and endeavors to explain, by means of this comparison, the laws of reflection and refraction.¹ In order to account for the production of colors by refraction, he ascribes to these balls an alternating rotatory motion.² This form of the *emission theory*, was, like most of the physical speculations of its author, hasty and gratuitous; but was extensively accepted, like the rest of the Cartesian doctrines, in consequence of the love which men have for sweeping and simple dogmas, and deductive reasonings from them. In a short time, however, the rival optical *theory of undulations* made its appearance. Hooke in his *Micrographia* (1664) propounds it, upon occasion of his observations, already noticed, (chap. viii.,) on the colors of thin plates. He there asserts³ light to consist in a "quick, short, vibrating motion," and that it is propagated in a homogeneous medium, in such a way that "every pulse or vibration of the luminous body will generate a sphere, which will continually increase and grow bigger, just after the same manner (though indefinitely swifter) as the waves or rings on the surface of water do swell into bigger and bigger circles about a point in it."⁴ He applies this to the explanation of refraction,

¹ *Diopt.* c. ii. 4.

² *Meteor.* c. viii. 6.

³ *Micrographia*, p. 56.

⁴ *Micrographia*, p. 57.