

What is meant by the motion of a moving point at a given instant? Properly speaking, there is no such thing; but what we mean in speaking thus is the motion which takes place in an indefinitely short time in which that instant lies.

Similarly the motion of a moving point, at a given point in space, is understood to mean the motion which takes place through an *indefinitely small space in which the fixed point lies*.

Having now gained some definite notions, we are ready to answer some objections which have been made to the law of conservation on the contact theory.

It has been objected that when two rigid atoms rebound from each other, the motion of each must have been totally destroyed when impact took place, and immediately recreated.

We may reply thus: If the motion had been destroyed, there must at least have been an indefinitely short time during which there was no motion, duration being absolutely necessary to motion; but the contact was instantaneous, it did not occupy time, hence the motion was never destroyed.

Again: the two atoms passed through no space while in contact, for the same reason, hence they cannot acquire a common motion. If this were not so, what would the result be? If adjacent surfaces of two atoms were in contact, that is, coincided, and they had no relative motion, there would be no real division between them. In passing from the interior of one atom to the interior of the other, we should come across nothing whereby we could assert that they were not continuous; in fact, they would form one rigid atom. But if we consider the matter, we shall see that it would be perfectly impossible, by any force, however great, to press the atoms together so that they can form one continuous atom. The only forces with which we are acquainted being blows or collisions, we should have to strike the atoms together; they would rebound; and no matter how hard or how fast we struck them, they would rebound at every blow. All pressures consist of a rapid succession of minute blows. We recognize no such thing as dead pressure, or a force acting without being the result of motion. That pressure is possible between two surfaces which are not constantly striking and rebounding is, from our point of view, absolutely inconceivable. All our forces are the result of relative motion in the direction of the space between the bodies considered.