A mathematical model was developed to predict the time displacement histories of objects translated by the blast winds from conventional or nuclear explosions; these predictions were then compared to actual experiments.

The objects studied varied in size from 139 mg spheres to man and were all assumed to be free to move over a smooth horizontal surface. The effects of ground friction could either be included or neglected, but when they were considered the ground friction eventually brought the objects to rest after the winds had passed. The values of ground friction used were determined experimentally and were found to be functions of the velocity and mass of the object being displaced.

The translational model was general enough for either classical or nonclassical blast waves to be considered. Results for a chemical explosion were obtained by using both to computed blast waves of various authors and the experimentally determined blast waves. These predicted results were compared with each other as well as with experimental data obtained with steel spheres. The model was used to determine dynamicpressure impulses necessary to explain the measured sphere velocities at three ranges from ground zero.

Another mathematical model was briefly described which was developed to compute the detailed two-dimentional trajectories of objects as they roll, slide, and bounce along the ground. The model closely predicted the measured distances between bounces and the total displacements of concrete blocks and large stones and thus helped to explain the mechanisms of tumbling by which an irregular object may become airborne during both the accelerative and the decelerative phases of displacement.