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VECTOR PRODUCT AND ITS APPLICATION

The paper is devoted to the problem of vector product. Vector algebra is a branch of vector calculus studying elementary operations on vectors including linear operations on vectors like vector addition and multiplication of a vector by a number.

The concept of vector is one of the fundamental concepts of modern mathematics. For the first time the concept of a directional vector segment has been used in mechanics to describe the physical vector quantities: velocity, acceleration, force, moment of force and so on. The clarity and simplicity of geometrical operations on vectors as directed line segments contributed to the universal acceptance and application of concept of vector in the branches of physics like kinematics, statics, dynamics of point, dynamics of system, potential theory, hydrodynamics. The concept has become one of the basic concepts of vector algebra, vector analysis, field theory, tensor analysis and so on.

Vector product is bilinear, antisymmetric operation on vectors in three dimensions. Unlike the scalar product of vectors of Euclidean space, the result of vector product is a vector, not a scalar. The concept of the vector product is purely spatial. It is quite different from the concept of product numbers, but retains some common features.

The use of the vector product in geometry enables to calculate the area of a polygon, the sine of the angle between vectors, to clarify the facts of collinearity of vectors and points, to find the vector orthogonal to the given ones.

The vector product of vectors is a productive concept considering the studying and solving the following problems of analytical geometry:
- distance from point to line in three dimensions;
- common two perpendicular skew lines;
- the square of a triangle given by coordinates vertices;
- transition from general line equations in space to the canonical equations;
- distance between the skew lines;
- the derivation of the surface equation that passes through a given point and parallel to the two skew lines etc.

The problem of vector product will be studied while solving advanced problems in geometry and physics.