As we know that pressure and stress have same formulas but why pressure is a scalar and stress is a vector?

Answer

Pressure is the effect of a force applied to a surface. Pressure is the amount of force acting per unit area.

$$p = \frac{F}{A} \text{ or } p = \frac{dF_n}{dA}$$

p is the pressure,
F is the normal force,
A is the area of the surface on contact.
Pressure is a scalar quantity. It relates the vector surface element (a vector normal to the surface) with the normal force acting on it.

Stress

Stress is tensor quantity. The stress tensor has 9 components. Each of its components has a magnitude (a scalar) and two directions associated with it. When we discuss the forces that act inside deforming materials, we first define a free body, which represents a small element of the material/body in question (e.g. a crystal, a fold belt, a mass of granite magma, an abitrary volume of river water) that has been "cut out". We replace the internal forces by forces distributed over the surfaces of the "free body". When a force is applied to the surface of a free body, we can ratio the force to the area. This ratio is referred to as a stress, S. If the area is broken into innumerable infinitesimal areas, the stress is given by:

S = lim F/A
A=>0

Like force and velocity, stress is a vector quantity. The stress vector can be resolved into a component perpendicular to the surface (the normal stress), and a component parallel to the surface (the tangential, or shear stress)

The stress field about any point in the body may be isotropic (also called hydrostatic) or anisotropic (non-hydrostatic). If we imagine a simple, infinitesimal cube, with its sides oriented orthogonally to the three cartesian coordinates, we can define a normal stress, S1, S2, S3 perpendicular to each pair of sides of the cube. These stresses are defined so that S1>S2>S3. Note that stress has units of Pascals = N/m^2, (where N = newton). The Pascal is the SI unit of pressure; a Newton is defined as the force necessary to accelerate a one kilogram mass by one meter per second, per second. Twiss and Moores[1] note that the weight (which of course is a force = mg, where g = acceleration due to gravity) of an apple is about one

newton! A pressure of 1 bar (nominally, atmospheric pressure at sea level) is the equivalent of 100,000 apples per square meter.

Generally, we might ask what the state of stress might be for any arbitrarily defined plane that passes through the point in question (say, a bedding plane). To answer this type of question, the concept of a tensor was introduced. We use a second rank tensor to determine the magnitude and orientation of a stress vector acting on any given plane, and the tensor can be represented by a 3 x 3 matrix. a Vector is a first rank tensor, and the three components of a vector can be represented by a column matrix. A tensor of rank zero is a scalar quantity (such as speed, or temperature).