V. SHOCK PROPAGATION IN IRON

5.1 Difference Equations

The system of difference equations used here is based on one described by Wilkins (35), with the yield stress set to zero. Space is divided into points and cells as in Fig. 5.1. The particle velocity and the current position of the Lagrangian coordinate are defined on the points with integer label j, and other variables are assigned to the cells with half-integer labels $j+\frac{1}{2}$, etc.

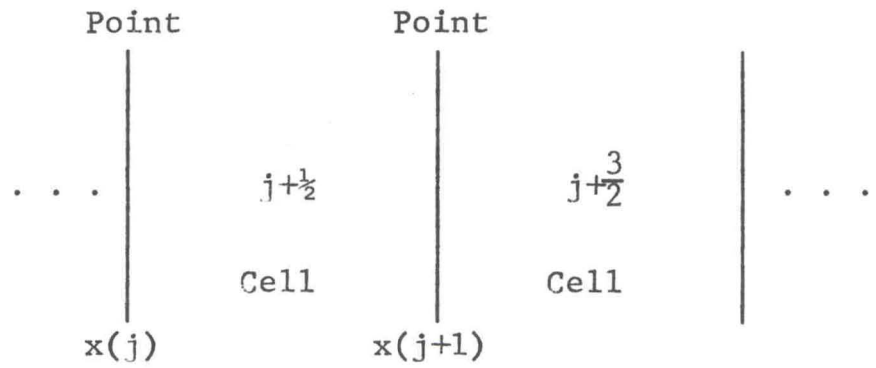

Fig. 5.1.--Difference Scheme in Space

Time differences are also staggered. Particle velocity and q are defined at half-integer times, $n+\frac{1}{2}$, and other variables are defined at integer times, n.

The computational sequence for general interior points and cells is given in Fig. 5.2.

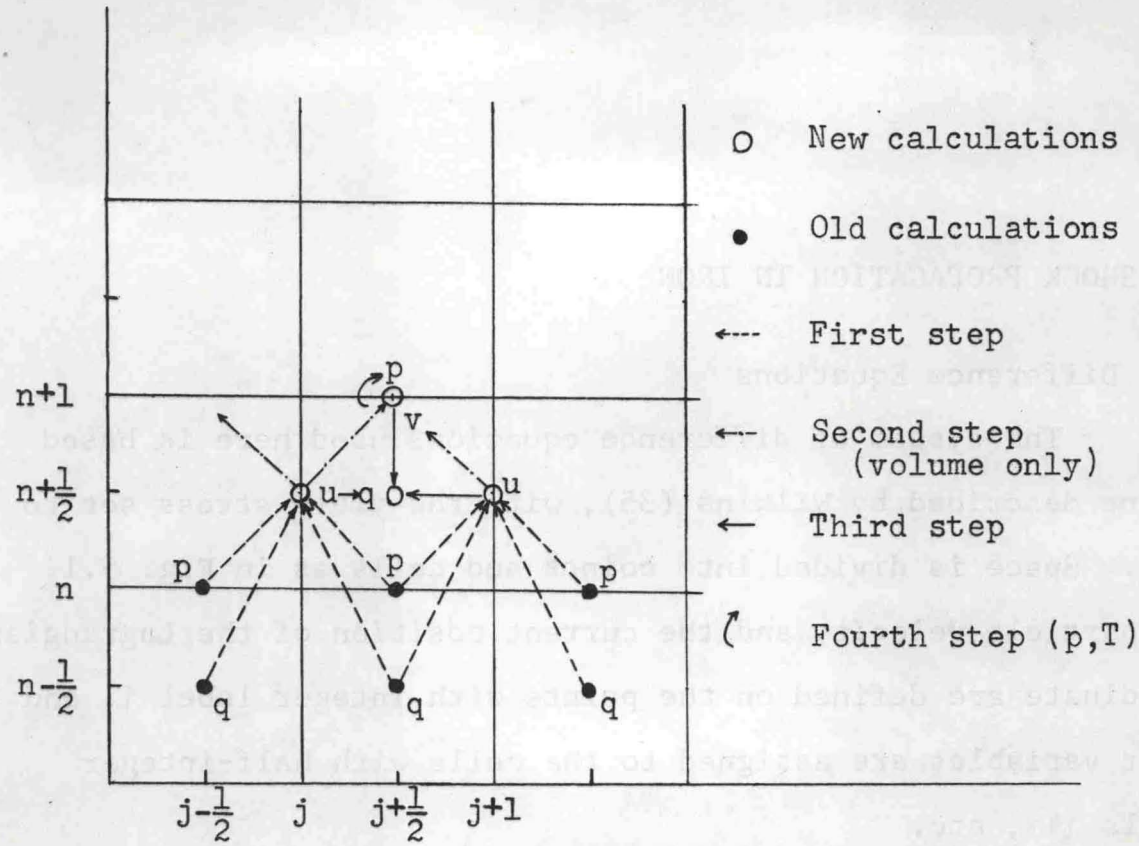

Fig.5.2.--Computational Sequence

The flow equations and the constitutive relations are approximated according to the above difference scheme. The difference equations are given in the order of computation. The subscript or superscript "o" refers to the initial state (p=0) of the first phase.

1. Equation of motion, Eq. (3.3):

$$u_j^{n+\frac{1}{2}} = u_j^{n-\frac{1}{2}} + \frac{\Delta t}{\Phi_j^n}\left(\Sigma_{j+\frac{1}{2}}^n - \Sigma_{j-\frac{1}{2}}^n\right) \tag{5.1}$$

where

$$\Sigma_{j+\frac{1}{2}}^n = -\left(p^n + q^{n-\frac{1}{2}}\right)_{j+\frac{1}{2}} \tag{5.2}$$

= total stress in the x-direction.