**عنوان مقاله:**

Theoretical Analysis of Maximum Radial Deflection of a Cylindrical Structure under Explosive Loading

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**خلاصه مقاله:**

Internal explosive loading of cylindrical shells is a method of metal forming in which the needed energy is gained from detonation which produces a shock wave that propagates with supersonic speed. This shock wave is influenced by the energy-conveying medium. One of the major concerns while explosive forming of a cylindrical structure is to control the energy, which is suddenly set free to make the desired shape so that the unconsumed energy does not damage the specimen. In this study, the explosive forming, effective parameters, energy distribution principles during an explosive forming process and the energetic efficiency will be introduced. Afterwards, a new method, called the Energy Theory will be offered to calculate the maximum radial deformation of cylindrical shells under internal blast loading. Considering that the plastic collapse of the structure occurs by the formation of three ring plastic hinges at the top, middle and the bottom and also by the hoop stretching between thehinges, and only a small portion of the explosive energy is used to deform the work-piece, the theory is derived. Equality of the internal plastic work for the assumed deflection, to that portion of the explosive energy that is utilized to deform the cylindrical structure is the key point in the calculation of the maximum radial deformation. Comparing the maximum radial deformation of the cylindrical shells which have been tested in this research, with the theoretical results shows that the accuracy of the new theory is approximately 84.5%.

**کلمات کلیدی:**

Cylindrical Structure, Radial Deflection,Explosive Loading, Energetic Efficiency

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