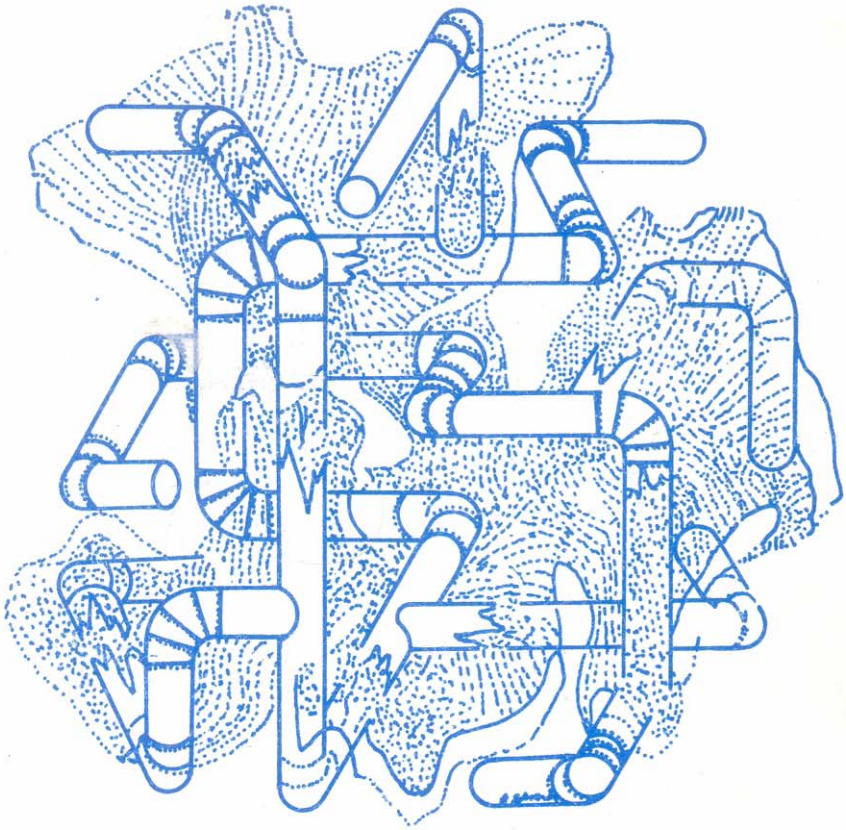
SECOND INTERNATIONAL COLLOQUIUM ON DUST EXPLOSIONS



JADWISIN 3 – 6. XI. 1986

Specific Features of Detonation in Systems with Losses of an Arbitrary Type

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Specific features of gaseous and heterogeneous detonations with losses of an arbitrary type are considered. It is shown that in the C-J plane of heterogeneous detonation there exist in principle incomplete combustion of the reactive mixture and difference in velocities and temperatures of the phases. The problem of uniqueness of the self-sustaining detonation velocity is considered. An example of gaseous detonation in a tube with rough walls is analyzed to show that a nonstationary solution of the problem is necessary for elucidation of a mode to be realized under certain initiation conditions.

It is shown that there are maximum values of the losses at which stationary propagation of the detonation wave is possible. Due to friction losses the limiting reduction of the detonation velocity by about 30-40 percent (as compared to that in a smooth tube) may be achieved in tubes with rough walls. The limiting value of the inert particle concentration at which stationary propagation of dusty detonation is possible depends also on the maximum friction losses in the reaction zone. A relation for the limiting particle concentration is derived.

The problems of modeling propagation of quasi-stationary detonation waves in large-scale blocked up volumes based on the results of laboratory-scale experiments are discussed. Such modeling is shown to be possible and the procedure for the blast hazard evaluation of the industrial manifolds is proposed. A possibility at propagation and parameters of quasi-stationary detonation waves in channels with technically rough surfaces, local obstacles in the form of welded joints, orifices, partitions, by-pass arrangements may be estimated in laboratory conditions using tubes with equivalent values of the hydrodynamic drag coefficients.