

# **NUMERICAL INVESTIGATION OF ECCENTRIC INTERNAL ROOM DETONATIONS AND INTERACTION WITH CONCRETE WALLS**

Paul W. Bückine, Christoph Mayrhofer  
Fraunhofer-Institut für Kurzezeitdynamik Ernst-Mach-Institut (EMI)  
Freiburg im Breisgau, Germany

When analyzing the numerical results of 3D-computations simulating eccentric detonations an important strong effect was found which seems has not yet been described in the literature available. This effect appeared in all cases of eccentric detonations considered with different explosive material, charge weight and rectangular room dimensions. The effect generated by the eccentricity of the detonation position is that after a short time the impulse on the wall further away is higher and even considerably higher than at the one which is much closer to the explosion. Though at the closer wall the incident shock will be considerably increased the impulse soon is less than the one at the opposite wall when the reflection from the close wall and its corner regions is incident. This effect is described and looked at in detail. The effect is especially strong when reflections from room corners are increased by shifting the detonation position on a room diagonal.

By associating this effect in impulsive loading with the dynamical wall behavior it was possible to explain reinforced concrete wall failure occurring in eccentric explosion experiments. In these cases the detonation position was distinctly further away from the wall being completely destroyed than from the wall which showed comparatively small damage. The reason for this unexpected result is explained by a detailed investigation and comparison of the impulsive loading distributions on the close and far walls at different fixed time instants.