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THE SIMULATION OF THE DAMAGE OF THE CONCRETE ROAD CAUSED BY THE BURIED PIPE EXPLOSION

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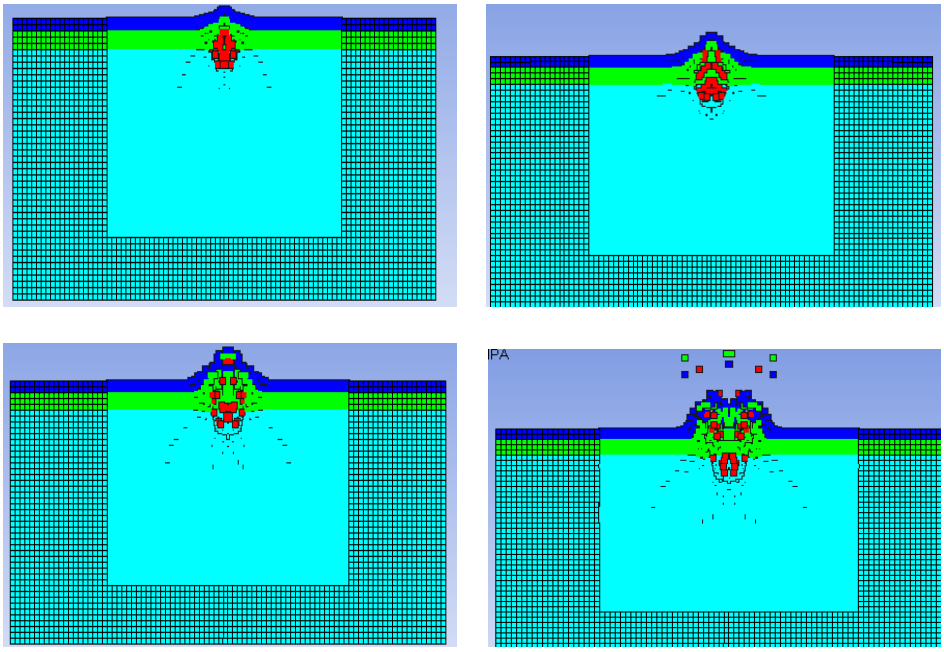
The buried pressure pipeline's explosion may result in serious huge life and property losses. The study of damage effect induced by pipeline explosion has important significance for the establishment of security risk evaluation system of underground utilities, as well as the security protection specification. In this paper the damage effect of the concrete pavement caused by buried explosion was simulated with the SPH and SPH-Lagrange coupled algorithm.

The formation of blasting crater and the transition laws of stress wave in multi-layer media under the concrete pavement by the explosion of the are simulated and the cumulative damage graphic, speed history curves and pressure history curves are obtained . The size of blasting carter presents a reasonable development trend of "small, big, small, largest, zero". The confidence level of the simulating results with the SPH-Lagrange coupled algorithm were verified by comparing with the experiment result in literature.



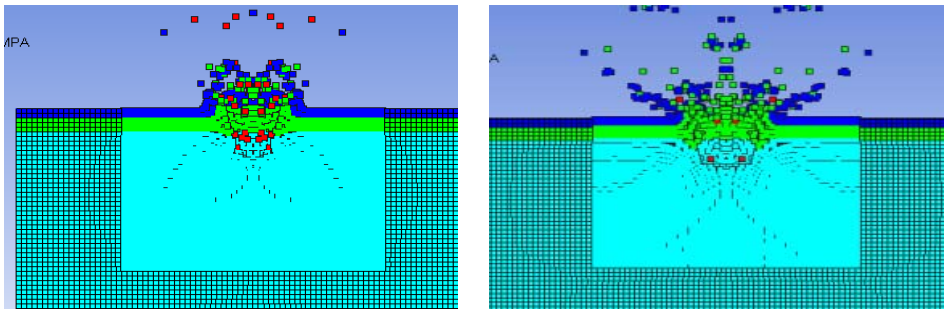


Fig1 The simulation of the damage of the concrete road induced by burid pipe

The explosion in the pipe was simulated and the influence of the pipe on the explosive shock wave propagation was analyzed. The results show that the pipe wall enhanced internal shock wave pressure, but on the other hand the bursting of the pipe consumes the explosion energy simultaneously. Whether The shock wave effect increase or decrease on the surround medie outside the pipe is depended on the thickness of the pipe wall ,the charge equivalent and other parameters.

The damage form of the concrete road induced by the inner explosion of the pipe was simulated. The sandy soil around the pipe forms a tapered shape along the pipe axis. Meanwhile, the concrete surface layer formed a spindle shape while the damage area extended annularly before concrete broke. From the cumulative damage graphic , speed history curves and pressure history curves, it was shown that the initial broken point is at the location opposite to the first broken sides in pipe, rather than that nearest to the detonation center.

Key Words: *Buried pressure pipe, explosion, concrete road, damage effect, SPH-Lagrange coupled method*

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