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Analysis on the plastic dynamic response on the reinforced concrete rectangular plate under explosive loading

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Abstract: To analyze the failure mode and final deformation of concrete rectangular plate under explosive loading, the energy method and plastic hinge theory is employed by regarding concrete as perfect rigid-plastic material. Large plastic deformation is usually brought about by explosion applied to the plate, while it is constrained by supporting boundary from which compressive reaction would effect on the plate when large deformation takes place. By assuming that the compressive reaction is acted on the equilibrium surface, a reaction parameter is defined in the motion balance equations to take the advantages of supports into account. There are two different failure modes of plate under different explosive peak overpressures, so the motion balance equations during and after the action of explosive loading are deduced in accordance with small or large deformation, which contributes to the failure process and final deformation of plate

by employing moving hinges theory. In order to verify the theoretical method, numerical simulations of reinforced concrete plate under explosion are carried out to investigate on the rigid-plastic of concrete, the effect of boundary by controlling variable method. By comparing the numerical results and theoretical ones compared, the analysis method in this paper is proved effective and available to analyze the plastic deformation and failure modes of reinforced concrete rectangular plate under explosion.

Key Words: *Explosive Loading, Dynamic Response, Rectangular Plate, Compressive Reaction.*