TRANSFORMER RUPTURE AND IMPACT ON THE REINFORCED BLAST WALL

Mazlan, Abu Seman¹, Yuntian Feng², Nasly Mohamed Ali¹ & Zainorizuan Jaini³

¹Civil Engineering & Earth Resources, Universiti Malaysia Pahang, Gambang, Pahang
²Civil & Computational Engineering, Swansea University, Wales, United Kingdom
³Civil & Environmental Engineering, University Tun Hussein Onn Malaysia, Batu Pahat, Johor
mazlan@hotmail.co.uk

Abstract

Transformer is one of vital equipment to provide stable and reliable electricity to the community. The capability to step up the voltage or vice versa, made transformer is main equipment to look after in the electricity industry. The transformer is quiet while in operation, therefore it is hardly to realise if placed inside the building. The price for one transformer can be up to few millions Malaysian Ringgit. The worst of the transformer explosion may lead to the major blackout. Transformer ruptures maybe due to, lack of maintenance or the problems inside itself whilst in operation. In the past at substation, the transformers were placed adjacent to each other and without a wall in between. Nowadays, installing walls between transformers have become in practice to protect other transformers if in any explosion events. In Malaysia, a reinforced wall is built for the protection. The finite element method (FEM) is employed for the simulation of the potential damage of reinforced blast wall. A FEM software is used due to the capability of analysing and simulating reinforced concrete structures subjected to high rate and short duration dynamic loading in the previous research works. The simulation results clearly reveal that, the behaviour of the crack propagation is almost identical for the different blast modes. After the impact load is applied, the cracks start to occur at certain time instants at the bottom of the wall on the transformer side. This follows later with the cracks on the other side at about one third of the wall height. The propagations of the crack then continue to move downwards in the curvy shape. The previous work and the field test provide indirect evidence that the structural behaviour and the cracks patterns are comprehended.