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34-47 An Investigation on Underwater Explosive Bonding Process

八代高専機械電気工学科	助 手	井 山 裕 文
崇城大学工学部機械工学科	講 師	吉 良 章 夫
	教 授	藤 田 昌 大
九 州 大 学 大 学 院	助 手	久保田 士 郎
衝撃・極限環境研究センター	助 教 授	外 本 和 幸
	教 授	伊 東 繁

In this paper, we propose a new explosive bonding method for bonding materials by using the underwater shock wave from the explosion of explosives in water. This method is especially suitable to bond the materials with the thin thickness and the largely dissimilar property. In bonding those materials, the shock pressure and the moving velocity of shock wave on the flyer plate should be precisely managed to achieve an optimum bonding conditions. In this method, the bonding conditions can be controlled by varying of the space distance between the explosive and the flyer plate or by inclining the explosive charge with the flyer plate. We made the experiment of this technique bond the amorphous film with the steel plate. A satisfactory result was gained. At the same time, numerical analysis was performed to investigate the bonding conditions. The calculated deformation of the flyer plate by the action of underwater shock wave was compared with the experimental recordings by high-speed camera under the same conditions. The comparison shows that the numerical analysis is of good reliability on the prediction of the experimental result. Furthermore, the numerical simulation also gives the deformations of the flyer and the base plate, and the pressure and its variation during the collision process.

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