

SEISMIC WAVES TRANSMITTED FROM ROCK TO WATER: THEORY AND EXPERIENCE

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ABSTRACT

It has been common practice for many years to predict and control underwater blasting effects on the basis of certain simplified theories related to the pressures generated by underwater detonations. Unfortunately, two of the most commonly applied concepts in many instances do not provide an accurate modeling of typical field conditions nor the potential for damage. One of these concepts is that the damage potential is related directly to the peak pressure generated by an underwater detonation, without regard to the time history of the pressure pulse. This belief has led to the widespread use of air bubble curtains to reduce peak pressures, without considering the effect that air curtains have on the time history of the pressure pulse. At times, this procedure can be unwise. The other concept is based on the premise that pressure pulses in solids (such as rock) will always be transmitted to nearby water bodies in agreement with the theories of the transmission of plane waves across normal (perpendicular) boundaries. In reality, such conditions are quite rare.

The purpose of this paper is to caution the reader against the indiscriminate use of these concepts without proper evaluation of the field conditions. Failure to do so can result in predictions that may permit unexpected damage to occur, in predictions that prohibit work that is really quite safe, or make the work prohibitively expensive to perform.