

Abstract Submitted
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Numerical Model for Hydrovolcanic Explosions. CHARLES MADER, Mader Consulting Co., MICHAEL GITTINGS, Science Applications International Corporation — A hydrovolcanic explosion is generated by the interaction of hot magma with ground water. It is called Surtseyan after the 1963 explosive eruption off Iceland. The water flashes to steam and expands explosively. Liquid water becomes water gas at constant volume and generates pressures of about 3GPa. The Krakatoa hydrovolcanic explosion was modeled using the full Navier-Stokes AMR Eulerian compressible hydrodynamic code called SAGE [1] which includes the high pressure physics of explosions. The water in the hydrovolcanic explosion was described as liquid water heated by magma to 1100 K. The high temperature water is treated as an explosive with the hot liquid water going to water gas. The BKW [2] steady state detonation state has a peak pressure of 8.9 GPa, a propagation velocity of 5900 meters/sec and the water is compressed to 1.33 g/cc.

[1] Numerical Modeling of Water Waves, Second Edition, Charles L. Mader, CRC Press 2004.

[2] Numerical Modeling of Explosions and Propellants, Charles L. Mader, CRC Press 1998.

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