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Small-Amplitude Richtmyer-Meshkov Instability at a Re-Shocked Material Interface[1] A.L. VELIKOVICH, S.T. ZALESAK, Plasma Physics Division, NRL, N. METZLER, Y. AGLITSKIY, SAIC — We report an exact small-amplitude theory of the Richtmyer-Meshkov (RM) instability developing at a re-shocked material interface and favorably compare it to our simulations. The re-shock is seen to restart the classical RM instability growth from a larger initial amplitude, at a higher rate, and change its direction from heavy-to-light to light-to heavy and vice versa. Similarly, if a Rayleigh-Taylor (RT) unstable interface is strongly re-shocked from either the heavy or light fluid side, the fast RM growth is triggered. If a RT-unstable ablation front is re-shocked, it exhibits the ablative RM-instability, that is, low-frequency decaying oscillations [V. N. Goncharov, PRL **82**, 2091 (1998); Y. Aglitskiy *et al.*, PRL **87**, 265001 (2001)]. This is predicted for colliding foil experiments on the Nike laser, where a RT-unstable ablation front is re-shocked by the strong shock wave produced in the collision of the laser-driven plastic foil with a stationary foam layer. The re-shock stops the acceleration and switches the perturbation evolution from the ablative RT to the ablative RM regime.

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