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Initial condition versus mode-coupling dominance in the RT, RM, and KH hydrodynamic instabilities evolution– theoretical and numerical investigation. D. SHVARTS, Y. ELBAZ, N. WYGODA, Phys. Dept., NRCN, Israel — The Rayleigh-Taylor (RT), Richtmyer-Meshkov (RM), and Kelvin-Helmholz (KH) instabilities evolution and scaling are subjects of intensive experimental and theoretical research because of its importance in inertial confinement fusion (ICF)and astrophysics. In this work, we analytically and computationally study the dependence of the instability dynamics on the initial conditions (amplitude and spectrum) using a mode-coupling extension to Haan's model [1-3]. We identify the regimes of initial conditions (i.c.), in which the growth rate of the instabilities are dominated either by the i.c. or by mode coupling, and find the transition region between the two regimes, similar to [4]. Using these modal models we were able to determine the different power laws and coefficients of the growth rates of the different instabilities and present new relationships between them. Comparison between the newly derived relationship and those derived from the bubble competition model [5] will be discussed. 1. S.W. Haan, Phys. Rev. A **39**, 5812 (1989) 2. S.W. Haan, Physics of Fluids B, **3**, 2349 (1991) 3. D. Ofer et al., Physics of Plasmas, **3**, 3073 (1996) 4. G. Dimonte et al., Phys. Rev. E **69**, 056305 (2004) 5. Oron et al., Physics of Plasmas, **8**, 2883 (2001)

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