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Disappearance of Widom Line for Liquid-Liquid Phase Transition with Horizontal Coexistence Line JIAYUAN LUO, Boston University, LIMEI XU, Peking University, SERGEY BULDYREV, Yeshiva University, AUSTEN ANGELL, Arizona State University, GENE STANLEY, Boston University — The study of spherically symmetric two-scale Jagla model with both repulsive and attractive ramps has been very successful in demonstrating the anomalous behavior of liquids (especially water) and its relation with respect to the existence of a liquid-liquid (LL) critical point. However, the co-existence line of Jagla model shows a positive slope, which is opposite to what has been found in the simulations of water. To more convincingly link the result of the study on Jagla model with that of water, we applied discrete molecular dynamics to Gibson and Wilding's modified Jagla model and found that by shrinking both the attractive and repulsive ramps, the slope of the coexistence line can be reduced to zero. However, at these values of the parameters, the LL critical point becomes completely unstable with respect to crystal and glass. We further studied the Widom line, defined as extreme of response functions and also continuation of the coexistence line into one phase region, and found Widom line disappeared in the case of zero slope of the coexistence line, due to the equal enthalpy of low-density liquid (LDL) and high-density liquid (HDL).

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