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Heterotic models with vanishing one-loop cosmological constant and possibly perturbatively broken supersymmetry GERALD CLEAVER, Baylor University, A. FARAGGI, ELISA MANNO, CRISTINA TIMIRGAZIU, University of Liverpool — It has been assumed that in a given string model there should exist all-order supersymmetric solutions to the F and D flatness constraints. This arises from analysis of point quantum field theories, for which if supersymmetry is preserved at the classical level (tree-level in perturbation theory), an index theorem forbids supersymmetry breaking at the perturbative quantum level. Therefore, in point quantum field theories supersymmetry breaking may only be induced by non-perturbative effects. We present a weak coupled free fermionic heterotic model that utilizes boundary conditions that are both symmetric and asymmetric in the basis vectors that break SO(10) to SO(6)$\otimes$SO(4), with respect to two of the twisted sectors of the $Z_2 \otimes Z_2$ orbifold. The consequence is that two of the untwisted Higgs multiplets, associated with two of the twisted sectors, are projected from the massless spectrum. As a result, the string model contains a single pair of untwisted Higgs doublets. In the process of seeking such a model with a phenomenologically viable supersymmetric flat direction we arrive at the unexpected conclusion that the model may not contain perturbative all-order supersymmetric flat directions. In the least, this model appears to have no D-flat directions that can be proven to be F-flat to all order, other than through order-by-order analysis.

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