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Swampland Distance Conjecture for One-Parameter Calabi-Yau Threefolds

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We investigate the swampland distance conjecture (SDC) in the complex moduli space of type II compactifications on one-parameter Calabi-Yau threefolds. This class of manifolds contains hundreds of examples and, in particular, a subset of 14 geometries with hypergeometric differential Picard-Fuchs operators. Of the four principal types of singularities that can occur —specified by their limiting mixed Hodge structure —only the K-points and the large radius points (or more generally the M-points) are at infinite distance and therefore of interest to the SDC. We argue that the conjecture is fulfilled at the K- and the M-points, including models with several M-points, using explicit calculations in hypergeometric models which contain typical examples of all these degenerations. Together with previous work on the large radius points, this suggests that the SDC is indeed fulfilled for one-parameter Calabi-Yau spaces.

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