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Critical-Curve Topologies of Triple Gravitational Lenses

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An extrasolar analog of the Sun - Jupiter - Saturn system has been discovered recently by detecting its gravitational microlensing action on the flux from a background star (Gaudi et al. 2008). More generally, however, gravitational lensing by a system of three bodies has not yet been satisfactorily analyzed theoretically. Correct interpretation of microlensing light curves requires an understanding of the geometry of the underlying lens caustic and critical curves. These curves correspond to source positions and image positions, respectively, with infinite point-source-flux amplification. Following the pioneering Erdl & Schneider (1993) analysis of the parameter dependence of binary lensing, we extend their approach to special cases of the triple lens. While the binary lens is characterized by two parameters, three more parameters are needed to describe the triple lens. We present here an example of two-dimensional and three-dimensional cuts through the five-dimensional parameter space, identifying the boundaries of regions with different critical-curve topology.