Optimal bielliptic transition between coplanar elliptical orbits

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An analytic solution of the problem of the bielliptic three-pulse transition between circular orbits and an analytic solution for the problem of the bielliptic transition between coaxial elliptic orbits are presented. These solutions were published in a number of sources. In this article, an attempt is made to generalize the existing results for the case of the transition between two specified points belonging to boundary disparate elliptic orbits when the radial values of the transition orbit apogee are specified. An analysis of the obtained relationship for the size of the total pulse increment of the velocity necessary for the performing the bielliptic maneuver is given. The limiting case in which the bielliptic transition degenerates into a biparabolic transition is considered. The dependences of the transition orbit parameters and the conditions under which the three-pulse transition can have advantages over the two-pulse one are established.

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