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Slow Snake-Like Motions of Linkages

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We investigate slow (quasi-static) snake-like motions of linkages along a rough horizontal plane owing to changing their configurations. We consider two-member linkages with variable lengths of the links, controlled by forces acting along the links. The angle between the links can be constant or variable. We consider also three-member linkages with rigid links connected in star or in series, controlled by two torques acting between pairs of the links. Quasi-static controllability of all the linkages, with some constraints on their parameters, is proved. The slow gaits that enable the linkages to be driven to any prescribed position are constructed. Finally, we consider a homogeneous snake which can bend at each point of its body. The snake can be modeled by a linkage with large enough number of identical rigid links. We constructed an efficient slow gait enabling the snake to move along a given direction.

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