

Base-controlled mechanical systems and geometric phases

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We consider mechanical systems with configuration space a principal G -bundle $Q \rightarrow Q/G$ for which the base Q/G variables are being controlled. The overall system's motion is considered to be induced from the base one due to the presence of general non-holonomic constraints. It is shown that the solution can be factorized into dynamical and geometrical parts. Moreover, under favorable kinematical circumstances, the dynamical part admits a further factorization since it can be reconstructed from an intermediate (body) momentum solution, yielding a reconstruction phase formula. Finally, we apply this results to the study of self deforming bodies and derive a generalized Montgomery-type phase formula for them.