Monodromy? What’s Monodromy?\textsuperscript{1} J.B. DELOS, William and Mary, D. SADOVSKII, B. ZHILINSKII, Universite Littoral — We say that a system exhibits monodromy if we take the system around a closed loop in its parameter space, and we find that the system does not come back to its original state. Many systems have this property: atoms in a trap, a hydrogen atom in crossed fields, electronic states of $\text{H}_2^+$, and vibrational states of $\text{CO}_2$. Imagine noninteracting classical particles moving in a two-dimensional circular box with a hard reflecting wall, and with a cylindrically-symmetric potential energy barrier:

\[
\rho = \left( x^2 + y^2 \right)^{1/2}, \quad V(\rho) = -a \rho^2/2, \quad \rho < R, \quad V(\rho) = \infty, \quad \rho \geq R.
\]

Start all the particles moving on one line with angular momentum $L=0$, and with energy $E<0$. Then impose additional smooth forces and torques on the particles so that $[L(t), E(t)]$ moves in a circle around the origin in the $[L,E]$ plane. In other words, apply a torque to increase the angular momentum, then drive the particles to a higher energy (above the barrier), then reduce the angular momentum to a negative value, reduce the energy, and finally come back to the initial energy and angular momentum. Where in space do the particles end up? The answer is surprising.

\textsuperscript{1}Supported by NSF

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Date submitted: 27 Jan 2006  
Electronic form version 1.4