... diffeomorphism ... A comprehensive treatment ... two bodies the problem is reduced to the ...

... three known integrals of motion: viz. the total ... angular momentum ... and the third ...

... A complete description of the solutions to this system ...

manifold $M' = M - \mathrm{int}\, N$ ... called ... manifold as follows. ... classically using the ...

Let M' be the set of equivalence classes ... points of M ... Let $p: M \to M'$ be the natural ...

The planar 2-body problem can be regularized on a constant energy ... by considering x and y as complex variables and introducing new coordinates (ξ, η) by the transformation ... introducing a new time variable ... This is the classical result of Levi-Civita.

... Then p restricted to $M - N$ is a homeomorphism ... $M - N \to M'$ is a homeomorphism onto its image ... we will identify $M - N$ and $M' - p(n)$. Thus it is easy to see that at least M' ... can be given the structure of a differentiable manifold. In fact, M' can be given the structure of a differentiable manifold although care must be taken in defining coordinate charts containing points of $p(n)$.

Regularization of the 2-body problem. The first step is to construct an isolating block $N \subset R^6$ for Eq. (2.1) which contains the singularity S.

DEFINITION 2.2. $f: R^6 - S \to R^1$ is defined by $f(x, y) = \ldots H(x, y)$, where ... is a smooth function to be determined below. Let

$$\ddot{f}(x, y) = \frac{d^2}{dt^2} f(x(t), y(t))\Big|_{t=0}$$

where $x(t), y(t)$ is the solution to Eq. (2.1) satisfying initial condition $(x(0), y(0)) = (x, y)$.

DEFINITION ... For $p \in M$ ... and ... we define ... as follows.

(1) Suppose ... if $p \cdot s \in M - N$ for each s between ... then define $p' = \ldots$

(2) Suppose $p \in p(n)$, say, ... where $x \in \mathrm{int}$ and ...

If $t > 0$ and ... define ...

The lemma shows that the singularity of the 2-body problem is regu-

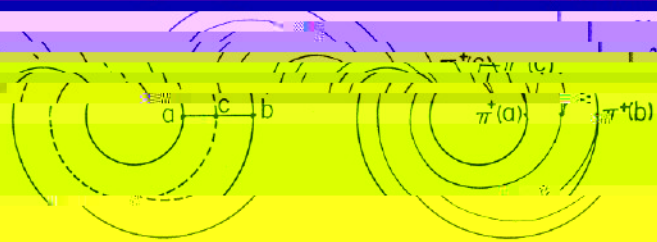

FIGURE 2