GLOBAL CROSS SECTIONS AND MINIMAL FLOWS

Let M be a closed $n-$dimensional manifold with a flow φ that has a global cross section Σ which is an $(n-1)$-dimensional disk, and let h be the (piecewise continuous) first return map for Σ. Our primary examples of such flows are minimal ones. We study how the return map captures topological properties of the flow and of the manifold. For a given map h if there exists an M, φ such that h is a first return map over some cross section then we call M, φ the suspension of h. As an application, we give several (piecewise continuous) maps of D^2 and a (piecewise continuous) map on D^3 which have suspensions. The suspension manifold of the map h_3 from figure 6 is homotopic to S^3. Hence, if there exists a suspendable minimal map of D^2 which is cell conjugate to h_3 then it induces a minimal flow on this homotopy $-S^3$. We also discuss ways to test if the suspension manifold is the suspension of a map on a closed manifold, as in the case of an irrational flow on $\mathbb{T}$, and when it cannot, as in the case of any flow on S^3.