1086-03-327 **Douglas Cenzer*** (cenzer@ufl.edu), **Valentina Harizanov** and **Jeffrey B. Remmel**.
Effective Two-to-One Structures. Preliminary report.

We examine structures of the form $A = (N, f)$ where f is a function from the natural numbers N to N such that at most two inputs map to the same output. If $|f^{-1}(a)| = 2$ for all a, then A is a two-to-one (2:1) structure. This extends previous work by the authors on injection structures. There are two types of orbits in a 2:1 structure. First, there are Z-chains with attached binary trees. This is an infinite sequence isomorphic to the integers Z, where each element maps to its successor, together with, for each point x in the Z-chain, a full binary tree in which each node maps to its predecessor and the top node maps to x. Second, there are k-cycles of the form $x, f(x), \ldots, f^k(x) = x$, with binary trees attached to each node as for the Z-chains. The character of a 2:1 structure is specifies the number of k-cycles for each k. We show that, as for injection structures, a computable 2:1 structure exists for any Σ^0_2 character and with any number of Z-chains. We prove that a 2:1 structure is computably categorical if and only if it has finitely many Z-chains. Also, every computable 1:1 structure is Δ^0_2 categorical. We also examine the more complicated structures in which f is not surjective. (Received August 21, 2012)