

1056-32-654

Alex L Castro* (alcastro@ucsc.edu), University of California, Santa Cruz, 1156 High Street, Math Dept - 194 Baskin, Santa Cruz, CA 95064, and **Richard Montgomery**. *The Chern-Moser chains of left-invariant CR structures on $SU(2)$ via Fefferman approach.*

We compute the chains associated to the left-invariant CR structures on the three-sphere. These structures are characterized by a single real modulus a . For the standard structure $a = 1$, the chains are well known and are closed curves. We show that for almost all other values of the modulus a , either two or three types of chains are simultaneously present: closed curves, quasiperiodic curves dense on two-tori, or chains homoclinic between closed curves. For $1 < a < \sqrt{3}$, no curves of the last type occur. A bifurcation occurs at $a = \sqrt{3}$ and from that point on all three types of chains are guaranteed to exist, and exhaust all chains. The method of proof is to use the Fefferman metric characterization of chains, combined with tools from geometric mechanics. The key to the computation is a reduced Hamiltonian system, similar to Euler's rigid body system, and depending on a , which is integrable. (Received September 15, 2009)