



Lectures of Professor Manuel Ritoré from the University of Granada, Spain

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF PITTSBURGH

MATHEMATICS RESEARCH CENTER

427 Thackeray Hall, September 18 and September 25, from 3pm to 5pm

Tubular neighborhoods for the Carnot-Carathéodory distance in the Heisenberg group.

We consider the Carnot-Carathéodory distance to a closed set in the sub-Riemannian Heisenberg groups \mathbb{H}^n . General regularity properties are proven under mild conditions involving a general notion of singular points. In the case where E is a Euclidean C^k submanifold, it is proven that the distance is C^k out of the singular set. Explicit expressions for the volume of the tubular neighborhood when the boundary of E is of class C^2 are obtained, out of the singular set, in terms of the horizontal principal curvatures of ∂E and of the function $\langle N, T \rangle / |Nh|$ and its tangent derivatives. Geometric applications will be indicated.

Professor Manuel Ritoré from the University of Granada is well known for a complete classification of double bubbles in the 3-dimensional space. A "standard double bubble" is made of three pieces of round spheres, meeting along a common circle at an angle of 120 degrees. Manuel Ritoré in a joint work with M. Hutchings, F. Morgan and A. Ross (Ann. Math. 2002) proved the celebrated double bubble conjecture which asserts that the unique perimeter-minimizing double bubble enclosing regions of prescribed volumes is a standard double bubble.
