

1086-65-197

Yves Nievergelt* (ynievergelt@ewu.edu), ynievergelt@ewu.edu, and **Theodore M. Cole** and **Caroline Rinaldi**. *Fitting helices to data*.

The problem of fitting a helix to data occurs, for example, in nuclear physics, to fit a trajectory to measured positions of a charged particle moving in an electromagnetic field, and in zoology, to study the growth of rodent incisors. Relative to the sum of the distances from the data to the helix, there are data without any best-fitting helix, and data with multiple best-fitting helices. However, users do not want such a best-fitting helix either. The regularization proposed here might be called the postman problem: minimizing twice the sum of the distances from the data to the helix plus twice the length of the fitted helical arc. Thus the objective function to be minimized is similar to the distance traveled by a postman delivering mail to houses along a dead-end street, walking along the street, marching to and from each door, and walking back along the same street but without visiting the houses again. A helix that minimizes this objective function is a helix that users want. (Received August 29, 2012)