1046-N1-1882 **Michael Frantz*** (frantzm@ulv.edu), Chair, Math/Physics/C.S. Dept., University of La Verne, 1950 3rd Street, La Verne, CA 91750, and **Vanessa Alday**. *The Effects of Wind and Altitude on 400-m Sprint Performances with Various IAAF Track Geometries.*

The effects of wind and altitude on the performance of athletes in the 400-m sprint are modeled and analyzed for various IAAF track geometries, using a differential equations model developed by Quinn. The validity of our implementation of the model is established by comparing model output (produced via Maple software) with published results for the standard IAAF track. The model is then modified and extended to measure the effects of a constant wind velocity and altitude on equal quadrant, non-equal quadrant, and double bend IAAF tracks. The model indicates clear advantages to runners for specific track geometries in constant velocity wind conditions, although changes in track geometry play no appreciable role in altitude effects. A preferred wind direction is determined which predicts a slightly faster time than under windless conditions. Small but noticeable effects for different running lanes are also established, although many other factors also strongly influence lane choices. The mathematics involved is restricted to that found in standard precalculus, calculus, and differential equations courses, with the added bonus of the need to solve a cubic polynomial equation to approximate the degree of slowdown due solely to the curve of the track. (Received September 16, 2008)