Fact Sheet

ARMY WINTER MOBILITY

PROBLEM

Military commanders and Army vehicle operators often lack the ability to determine and to predict the capabilities of their vehicles when operating in cold regions terrain materials such as snow, ice, and thawing soils.

SOLUTION

To develop an understanding of the difference in levels of mobility for typical variations in surface properties of snow, ice, and thawing soils, an instrumented vehicle has been employed. We have quantified changes in tractive ability and resistance to motion for a broad range of tires and for some traction aids; for selected snow depths, densities, and degree of wetness; for changes in ice temperature; and for various depths of thaw and water content in thawing soils. In addition, tests for traction and resistance also have been accomplished with a selected group of wheeled and tracked vehicles in snow and thawing soils. These data are being used to establish the relationship between vehicle performance and material properties. In some cases, laboratory tests to determine more sophisticated terrain material properties also are performed and related to vehicle mobility. In parallel with field and laboratory studies, theoretical and computer analyses of tire (or track) interaction with deformable terrain are being performed.

RESULTS

A shallow snow (depths up to 18 inches) mobility model has been generated for predicting vehicle traction and motion resistance. The model also includes predictions for travel on ice, hard-packed snow, and snow over ice or weak soils, and makes estimates for deep snow mobility. This model, coded in the BASIC and FORTRAN languages, will predict for any existing or imagined vehicle and allows the inclusion of trailers. It is included in the Comprehensive Army Mobility Model System (CAMMS), where it is used to make tactical decisions, and in the NATO Reference Mobility Model, which is used in vehicle design and selection.

Results of thawing soils mobility tests in a sandy silt now available show that mobility levels can be linked to thawing of soil. Changes in vehicle performance (traction and resistance) are directly related to thaw depth, and these relationships are being added to CAMMS.

CONTACT

Dr. Ronald A. Liston
603-646-4362
Fax 603-646-4644
rliston@crrel.usace.army.mil

August 1995

US Army Corps of Engineers
Cold Regions Research & Engineering Laboratory

CRREL, 72 Lyme Road, Hanover, NH 03755-1290