# Numerical Integration of Sparsely Sampled Data

Natalia Petrovskaya[1], Ezio Venturino[2]

[1]School of Mathematics, University of Birmingham, Edgbaston, Birmingham, B15 2TT, The United Kingdom

[2]Dipartimento di Matematica "Giuseppe Peano", Universita' di Torino, via Carlo Alberto 10, 10123 Torino, Italy

## Abstract

In experimental work as well as in computational applications for which limited computational resources are available for the numerical calculations a coarse mesh problem frequently appears. In particular, we consider here the problem of numerical integration when the integrand is available only at nodes of a coarse uniform computational grid. Our research is motivated by the coarse mesh problem arising in ecological applications such as pest insect monitoring and control. In our study we formulate a criterion for assessing mesh coarseness and demonstrate that the definition of a coarse mesh depends on the integrand function. We then discuss the accuracy of computations on coarse meshes to conclude that the conventional methods used to improve accuracy on fine meshes cannot be applied to coarse meshes. Our discussion is illustrated by numerical examples.