# An Introduction to the Piecewise Parabolic Method (PPM) Library
## II. I/O and Data Analysis

*David H. Porter,*
*Sarah E. Anderson,*
*Paul R. Woodward,*
*and B Edgar,*

Laboratory of Computational Science or Engineering,
Department of Astronomy, School of Physics and Astronomy
116 Church St. SE.
University of Minnesota
Minneapolis, Minnesota 55455

*ABSTRACT*

This is an introduction to the PPMLIB routines which allow the user to create customized restart dumps and compressed data dumps. The compressed data file format is consistent with the PPMLIB data analysis tools.

### 1. Introduction

This is as an introductory guide to the PPMLIB library routines for I/O and data analysis. These routines are modular in form and are adapted for parallel computing environments. They are based on similar routines developed at the University of Minnesota. It is hoped that these routines will allow the user to easily harvest the fruits of his computational labor. Two modes of I/O are adopted in PPMLIB. One mode stores the data at the full precision of the calculation. This allows the user to create periodically *restart dumps*, which are files from which the program can be restarted exactly, and computation resumed from that point at which the restart dump was written. The second mode is a *compressed dump.* In this format, only the most significant two bytes of each number is written to disk, reducing the data storage requirements, and thereby encouraging greater frequency of data sampling. This compressed format is matched to the PPMLIB data analysis program **a3d**, for use with 2- or 3-D data. **A3d** is used to create images from the data based upon an input text string describing the operations to be performed upon the quantities stored in the compressed data dump. For 3-D data sets, an additional routine **PVR** is available to construct perspective volume-rendered images of quantities selected by means of the text strings fed to the routine. The routines which may be used to construct restart dumps are presented first. This is followed by an explanation of the compressed data dump routines. This fictional account ends with descriptions of the analysis routines.

*a. Language*

The programming language used is FORTRAN, including the extensions for FORTRAN 90. To distinguish example source code from the explanatory text, the source code will be printed in a fixed width font. This short sample program is an example.

```
PROGRAM BETTER_THAN_C
DO I = 1, 10
   PRINT *,' Hello Universe!'
ENDDO
END ! PROGRAM BETTER_THAN_C
```

As with other PPMLIB guides, it is assumed that the reader has some experience in FORTRAN programming and understands the rudiments of text editing, compiling, debugging, and running programs in whatever environments are available.