

# Sample (Physical) Boundary Condition

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## Abstract

Provides a simple linear extrapolation boundary condition, to serve as an example for people who wish to write their own physical boundary conditions.

## 1 Introduction

This thorn provides a linear extrapolation boundary condition in three dimensions. It is intended as an example for writing physical boundary conditions. (See the ThornGuide for `CactusBase/Boundary` for details on Cactus boundary conditions.) It is registered under the name `LinearExtrap`.

The code which actually implements the boundary condition is written in fixed form Fortran 90, in the file `LinearExtrapBnd.F`. This code was written by Carsten Gundlach, and is taken directly from the thorn `AEIThorns/Exact`. As such it illustrates a simple way to properly implement a boundary condition using Fortran code which was written long before the current boundary implementation specification.

## 2 Obtaining This Thorn

This thorn is provided within the `CactusExamples` arrangement, in the standard Cactus distribution.

## 3 Some Details

The `LinearExtrap` boundary condition registered by this thorn only works in three dimensions. The value on a boundary face is determined by fitting a straight line through the two points 'inside' of the boundary point. For the edges and corners, two points along the diagonal are used to determine the line. In this way the thorn also provides an example of how to handle edges and corners, though only in a dimension specific way.

## 4 Using This Thorn

To use this thorn, simply activate it in your parameter file, select some variables for the `LinearExtrap` boundary condition, and be sure that `ApplyBCs` (as e.g. `MyThorn_ApplyBCs`) is scheduled at an appropriate point.