Appendix

# Appendix A

## Splitting the Helmholtz Equation

# Appendix B

## From one to two dimensions

We wish to give a proof of how we allowed the two equations:

|  |  |  |
| --- | --- | --- |
|  |  | (1) |

|  |  |  |
| --- | --- | --- |
|  |  | (2) |

In the form suitable to higher dimensions:

|  |  |  |
| --- | --- | --- |
|  |  | (3) |

|  |  |  |
| --- | --- | --- |
|  |  | (4) |

In the following explanations, we will use the notion of directional derivative. This is generally done along the unit vectors of the standard basis: and. The proof is given for the two dimensional space but the argument may easily be extended to any higher dimension.

## Second order derivative and Laplacian

Let be a function of the two space variable vector:.

The terms that contain the dot product nullify. And it remains:

## Product of first order derivative

Let and be two function of the two space variable vector:.

The terms that contain the dot product nullify. And it remains: