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| 1 | 2 | 3 | 4 | Σ |
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# Übungsblatt 06

(Abgabetermin 24.06.2021)

## Aufgabe 2.1:

### 0.1 Ultrasound

The data is represented by curvilinear grids because we have evenly distributed data points but the geometry is distored.

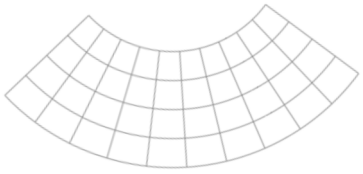

Abbildung 1: Curvilinear grid

### 0.2 CT-Grid

1. few computational power needed, important because of high amount of data
2. images are easily sliceable, makes switching between them easier because data points are structured layerwise and cells have always equal distances

## Aufgabe 2.2:

$\alpha = \frac{x-x_i}{x_{i+1}-x_i} = \frac{3-2}{8-2} = \frac{1}{6}$

$\beta = \frac{y-y_i}{y_{i+1}-y_i} = \frac{5-2}{6-2} = \frac{3}{4}$

$f_j = (1-\alpha)f_{i,j} + \alpha * f_{i+1,j} = (1-\frac{1}{6}) * (255,0,0) + \frac{1}{6} * (0,0,255) = (\frac{255*5}{6}, 0, \frac{255}{6})$

$f_{j+1} = (1-\alpha)f_{i,j+1} + \alpha * f_{i+1,j+1} = (1-\frac{1}{6}) * (0,0,255) + \frac{1}{6} * (0,255,0) = (0, \frac{255}{6}, \frac{255*5}{6})$

$f(x,y) = (1-\beta)f_j + \beta f_{j+1} = \frac{1}{4} * f_j + \frac{3}{4} f_{j+1} = (53, 125, 31, 875, 170) \approx (53, 32, 170)$

$\Rightarrow f(3,5) = (53, 32, 170)$

## Aufgabe 2.3:

- For Inverse Distance Weighting we have one exponetent, for Shepard interpolation we have one exponetent for the inner neighborhood and one for the outer neighborhood.

- The values must be divided into inner neighborhood and outer neighborhood. Then these must be weighted accordingly (closer values get a greater weight).

$$f(x) = \frac{\sum(||x-x_j||)^{-p} * f_j}{\sum(||x-x_j||)^{-p}} =$$
$$\frac{||(2,3,2)-(1,4,3)||^{-2}*14+||(2,3,2)-(7,6,1)||^{-2}*7.9+||(2,3,2)-(3,1,4)||^{-2}*6.5+||(2,3,2)-(5,9,9)||^{-2}*2.4+||(2,3,2)-(9,5,2)||^{-2}*9.8}{||(2,3,2)-(1,4,3)||^{-2}+||(2,3,2)-(7,6,1)||^{-2}+||(2,3,2)-(3,1,4)||^{-2}+||(2,3,2)-(5,9,9)||^{-2}+||(2,3,2)-(9,5,2)||^{-2}} \approx \frac{5.83}{0.50} \approx 11.59$$
$$\Rightarrow V = 11.59$$