

## Assignment: 1D ice flow model

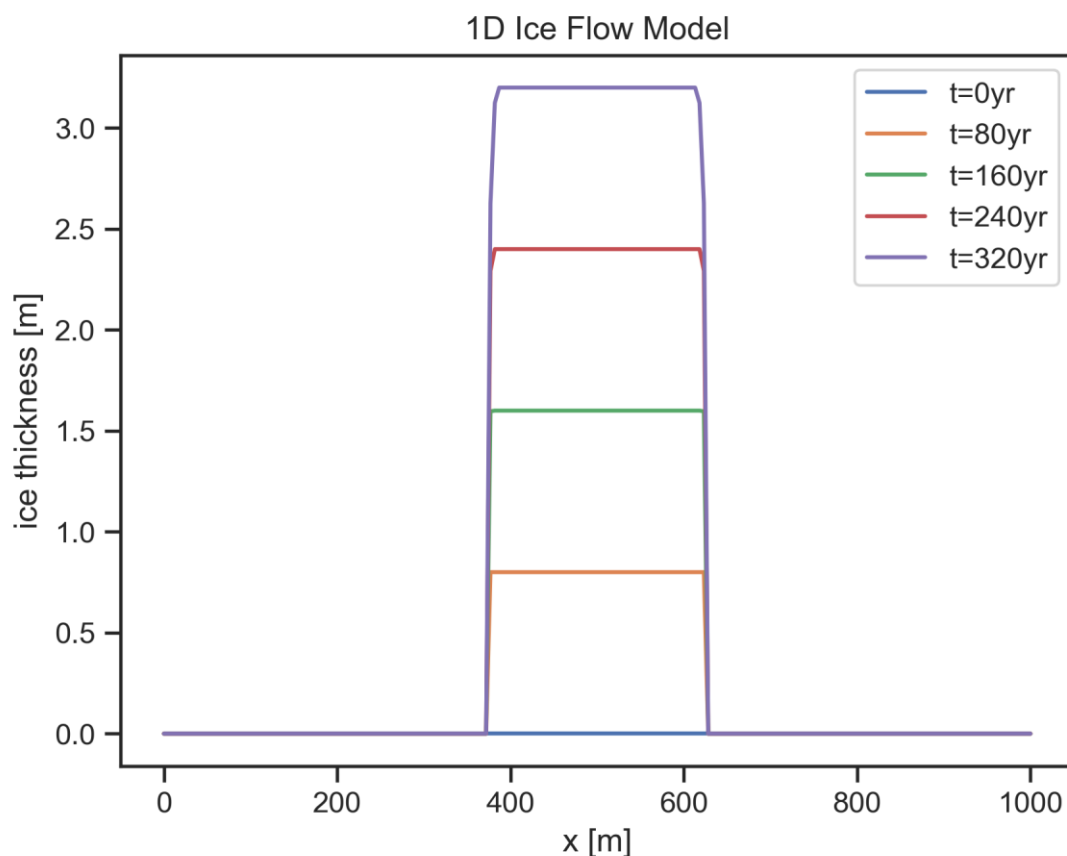
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### 1D ice flow model

I implemented the model and its equations following the approach of the latest video lecture. After tweaking the parameters for quite a while, I'm still struggling with numerical instabilities as the ice thickness increases and gradients become quite steep (I guess?).

It looks like the transport of ice between columns is very small compared to aggregation/ablation due to mass balance. On top, I've realized just now that my grid spacing might be too dense ( $dx \sim 10m$ ), compared to what I've just read on the discussion forum.

### Results



I'm also computing the Courant number for every point in space & time, and the above figure only displays the ice thickness before reaching numerical instability:

$dx = 5.03 \text{ m}$   
 $dt = 1 \text{ yr}$

Courant number 53.5 > 1 at t=319 and n=125; ice speed=268.8m/yr  
Courant number 17.7 > 1 at t=320 and n=125; ice speed=88.8m/yr  
Courant number 8.8 > 1 at t=321 and n=125; ice speed=44.3m/yr  
Courant number 5.3 > 1 at t=322 and n=125; ice speed=26.6m/yr  
Courant number 3.5 > 1 at t=323 and n=125; ice speed=17.8m/yr  
Courant number 2.5 > 1 at t=324 and n=125; ice speed=12.7m/yr  
Courant number 1.9 > 1 at t=325 and n=125; ice speed=9.6m/yr  
Courant number 1.5 > 1 at t=326 and n=125; ice speed=7.5m/yr  
Courant number 1.2 > 1 at t=327 and n=125; ice speed=6.0m/yr