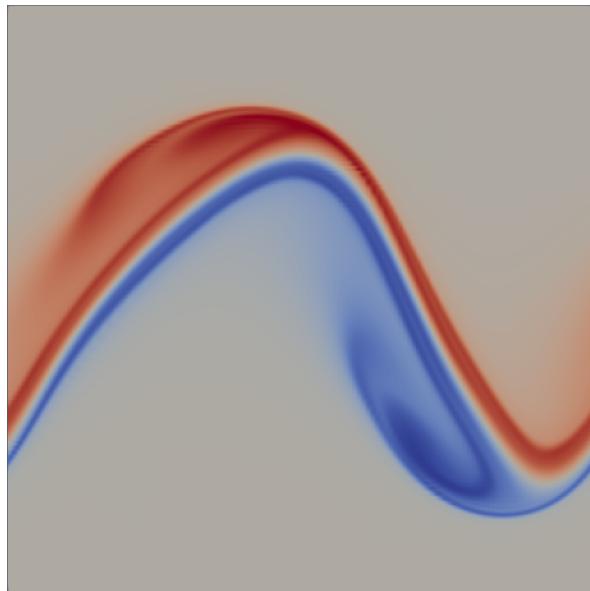
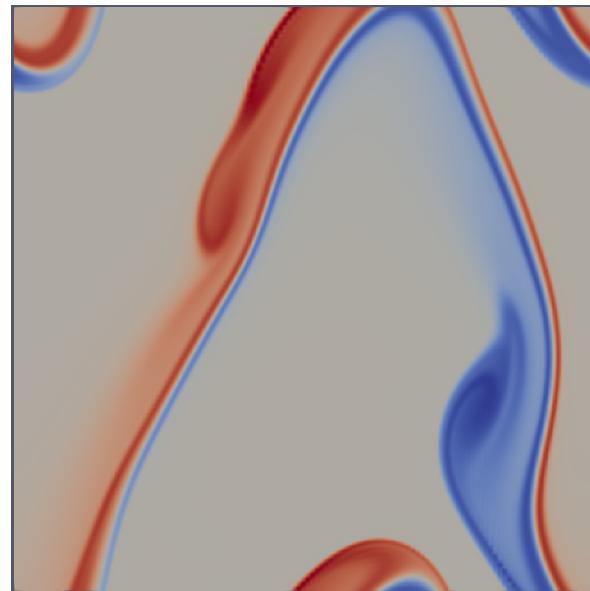


Exasim's results for the Bickley jet problem

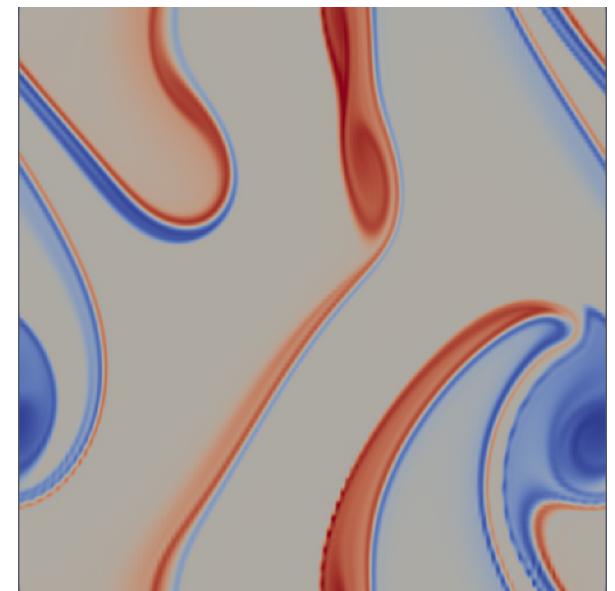
Shallow Water: $g=10, p=2, n=256$



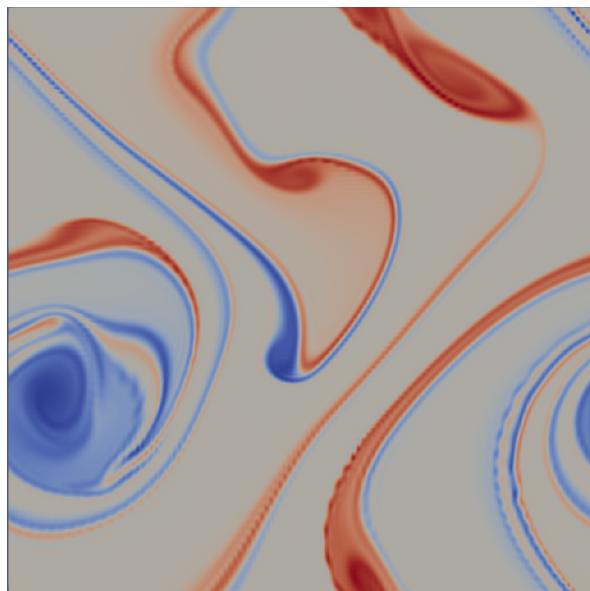
$t=36$



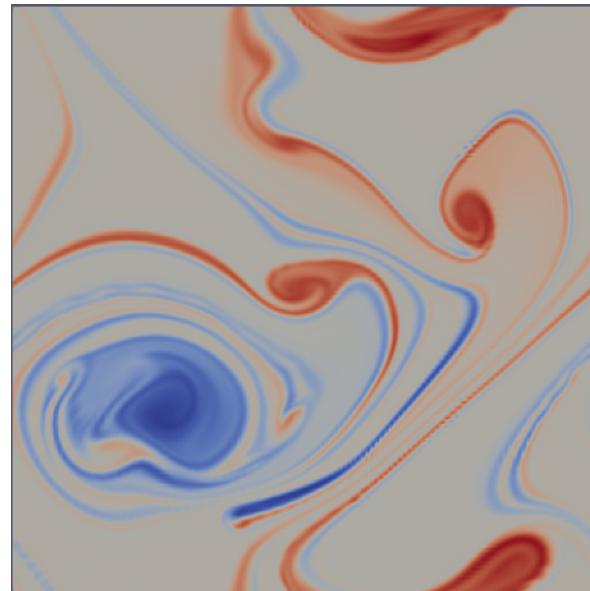
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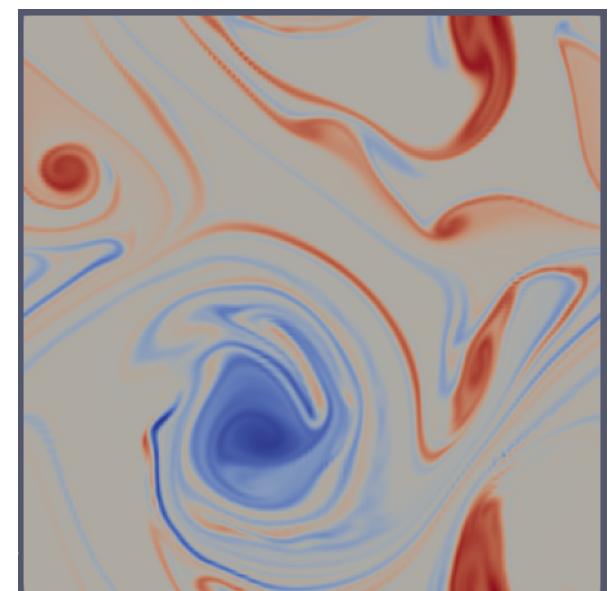
$t=60$



$t=72$

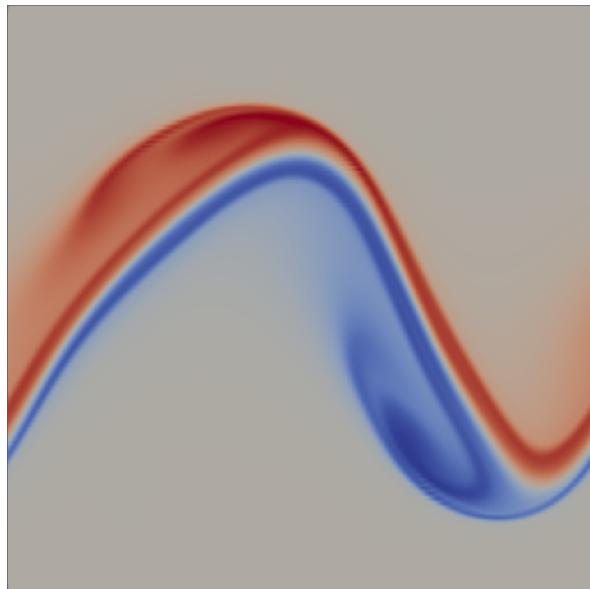


$t=84$

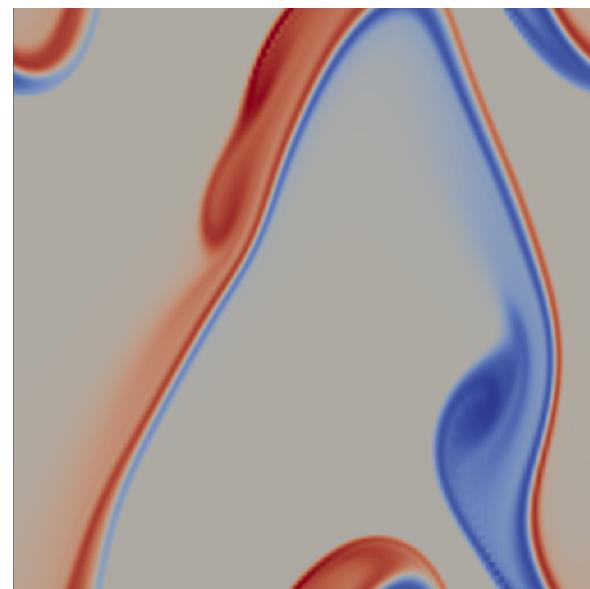


$t=96$

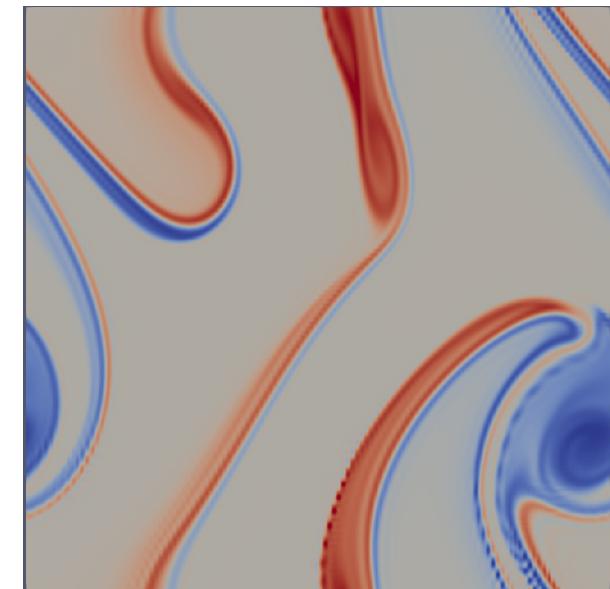
Shallow Water: $g=100, p=2, n=256$



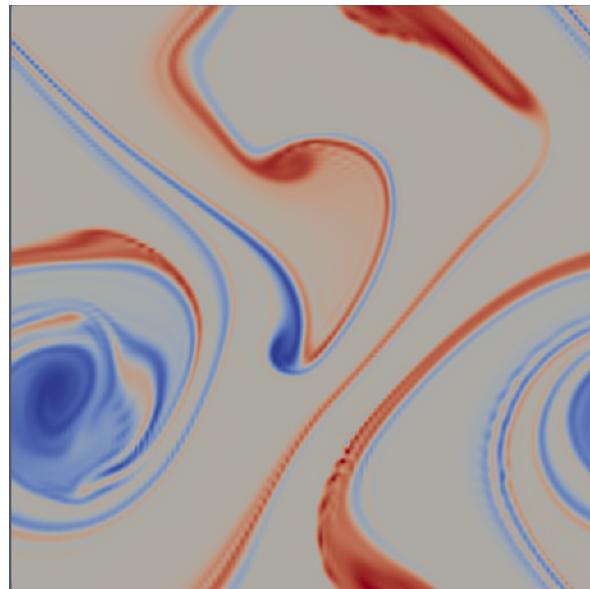
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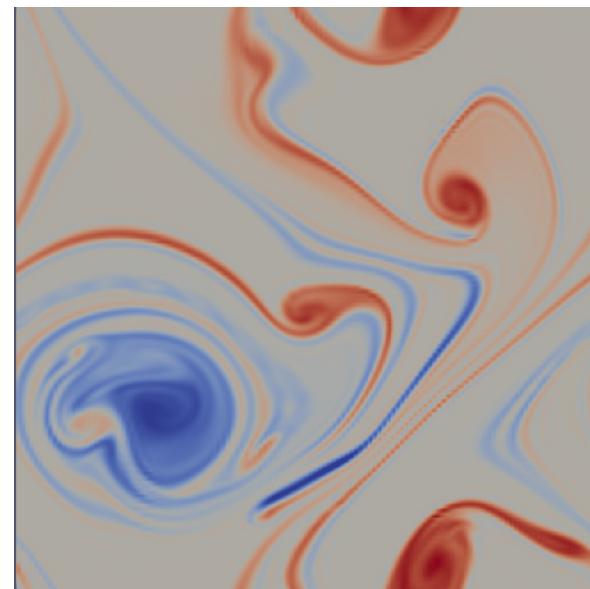
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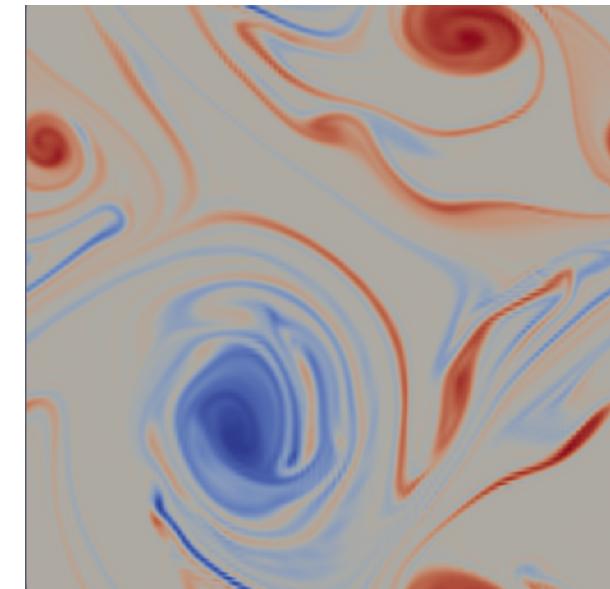
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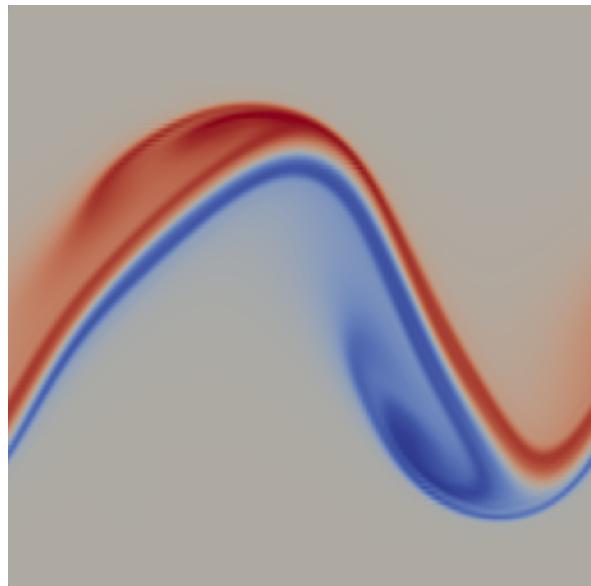


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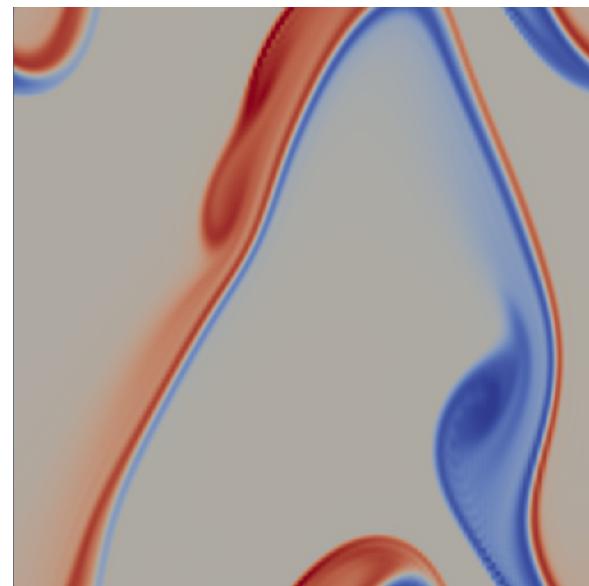


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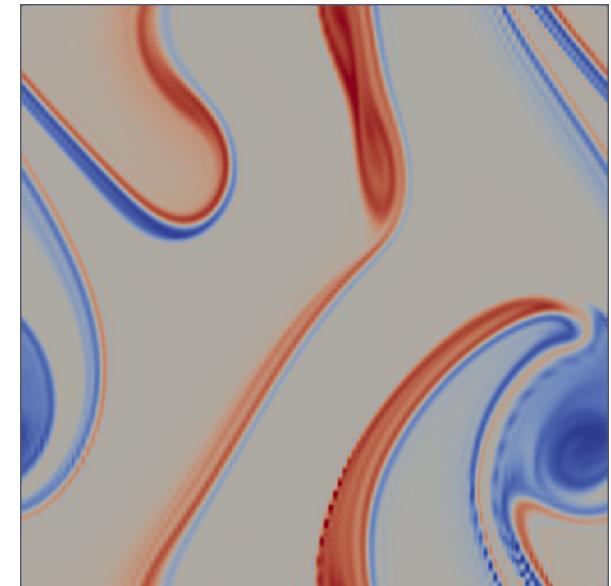
Shallow Water: $g=1000, p=2, n=256$



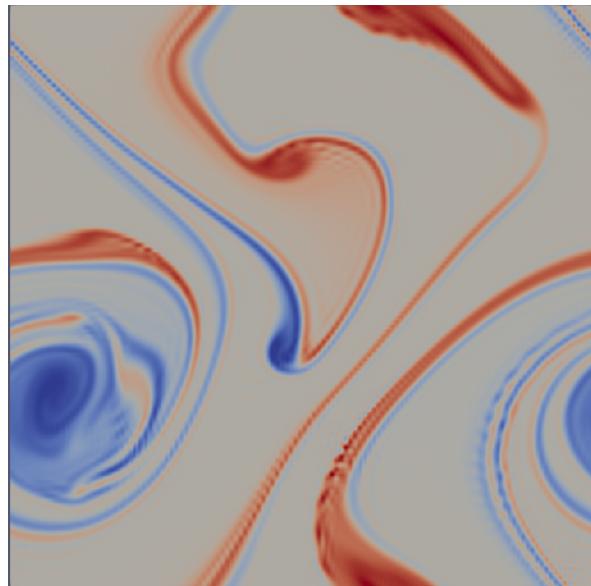
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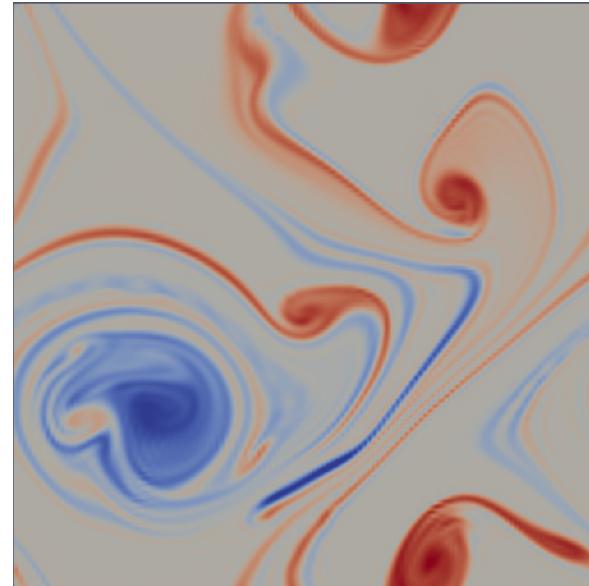
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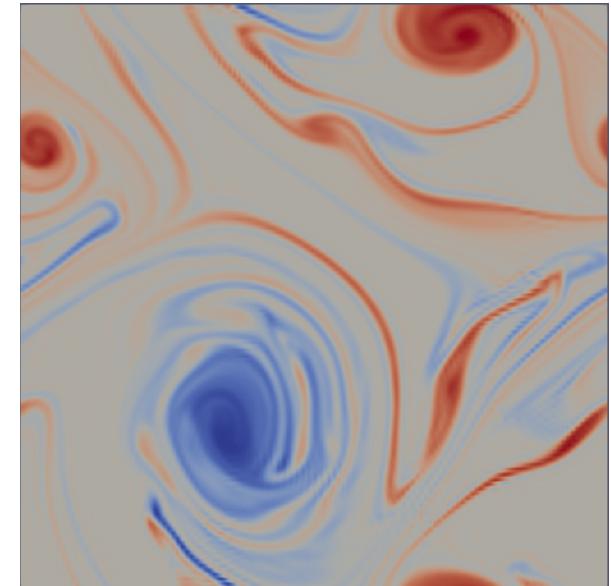
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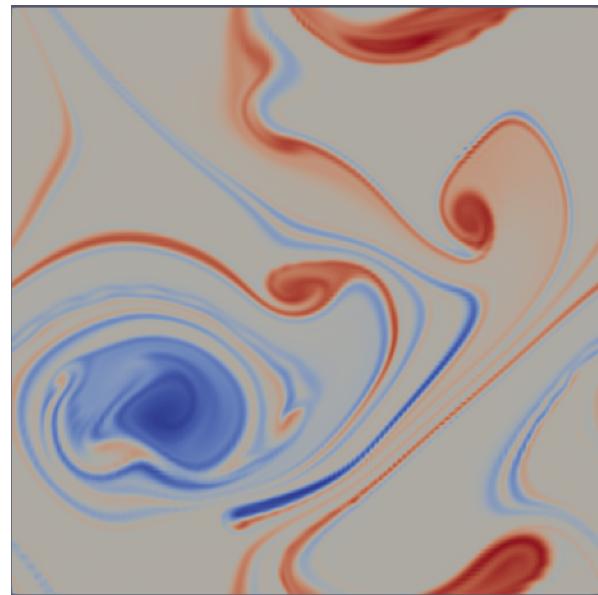


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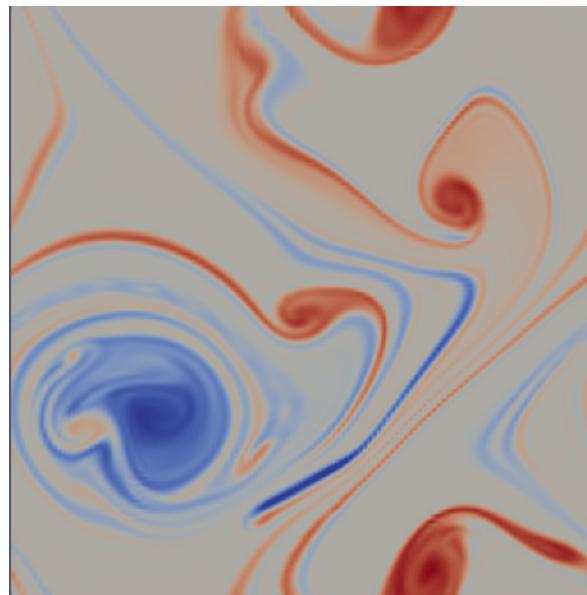


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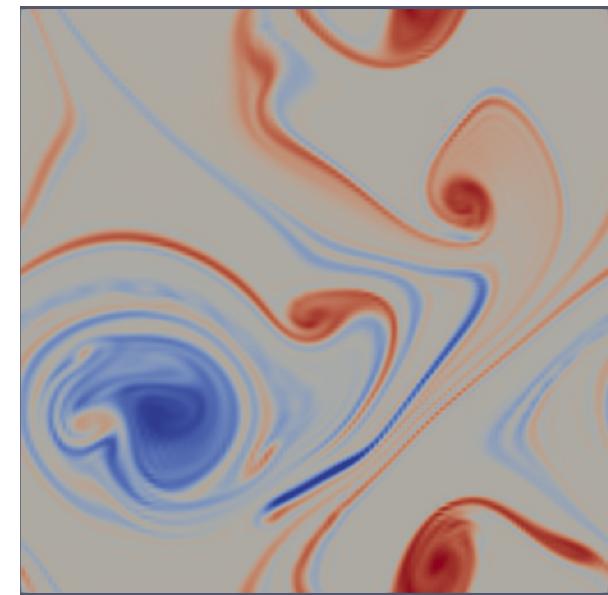
Shallow Water: $g=10$, 100, and 1000



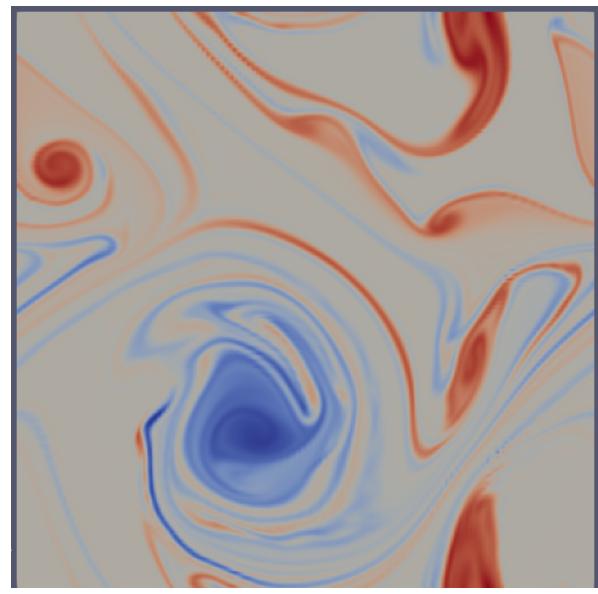
$g=10$



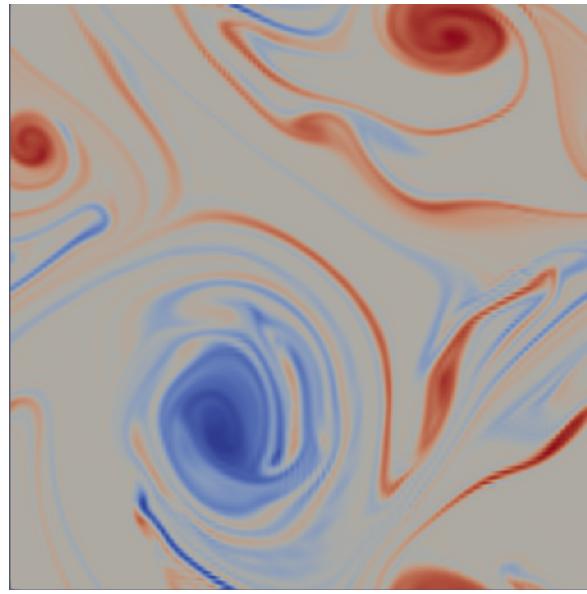
$g=100$



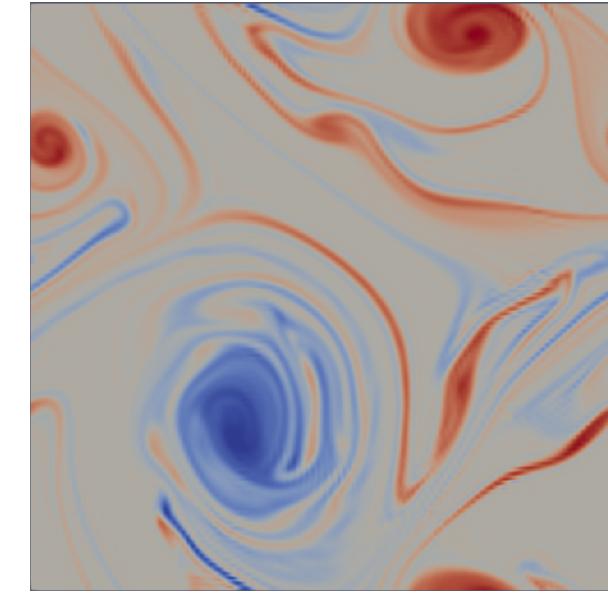
$g=1000$



$g=10$

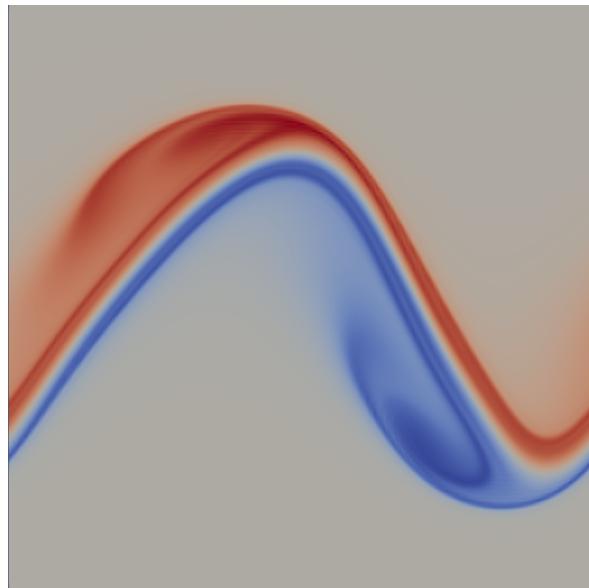


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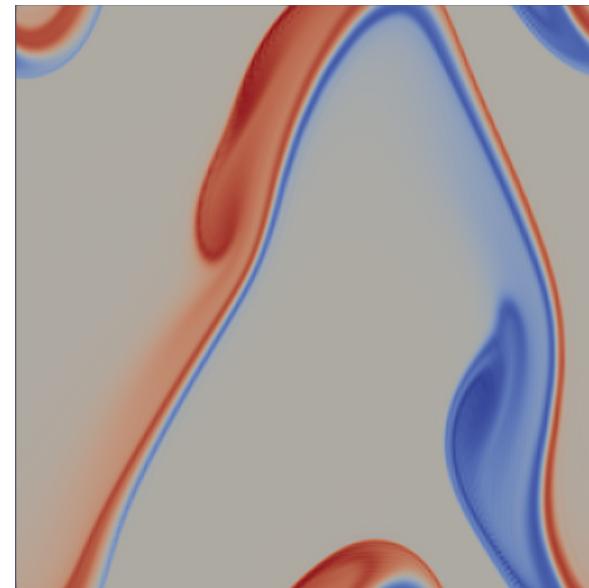


$g=1000$

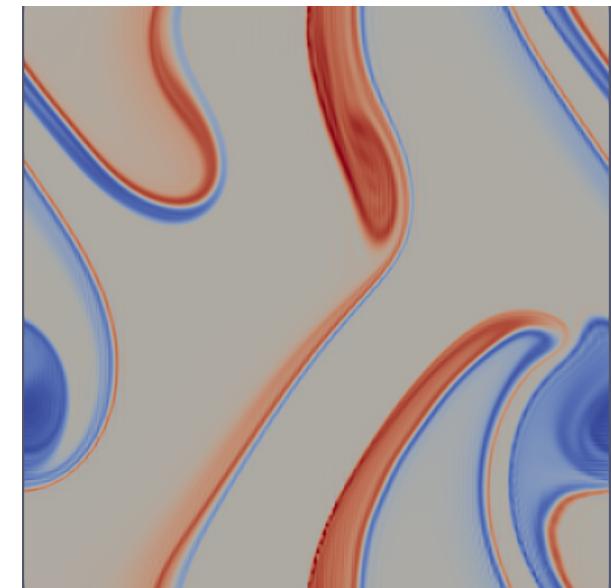
Euler: $g=10, p=4, n=256$



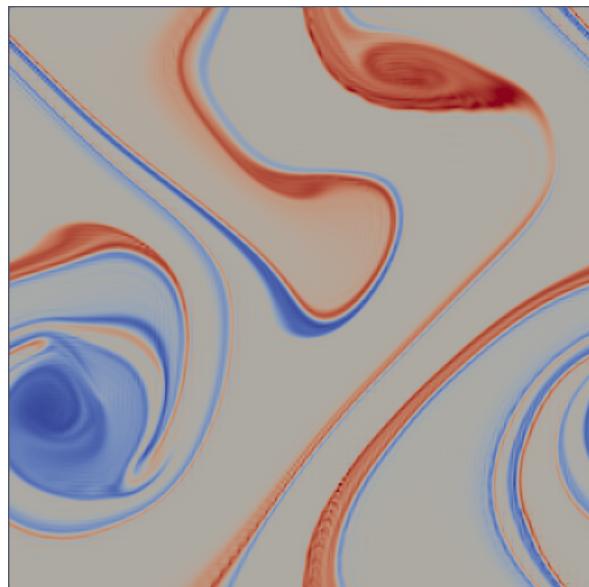
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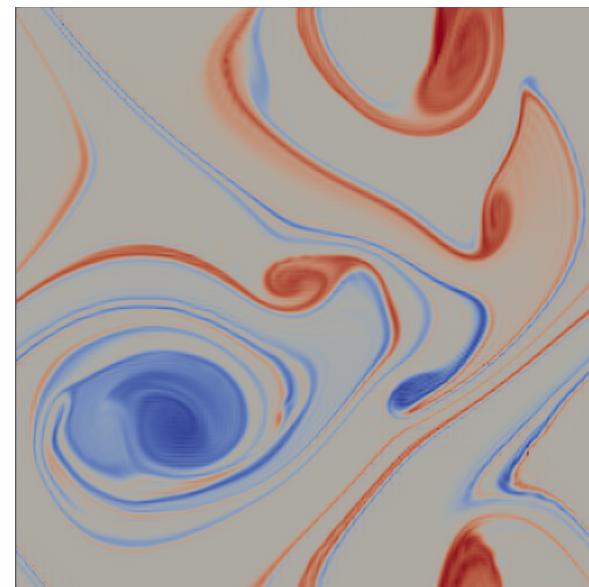
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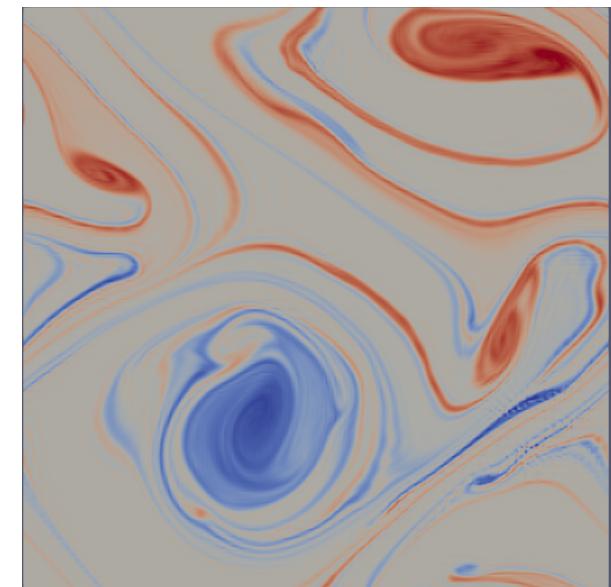
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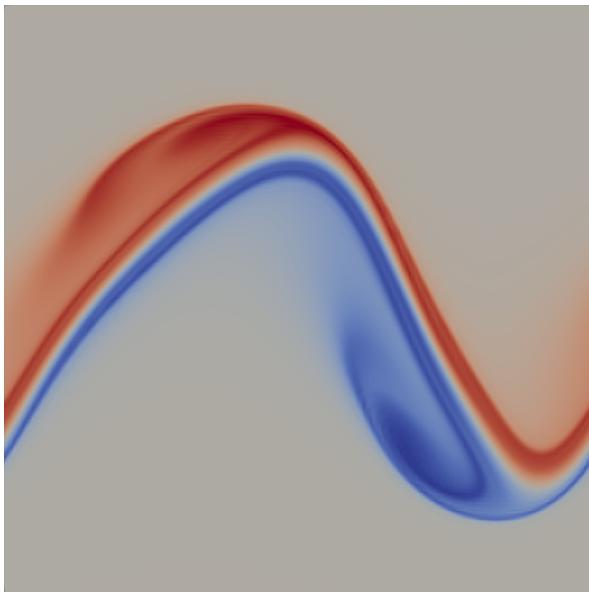


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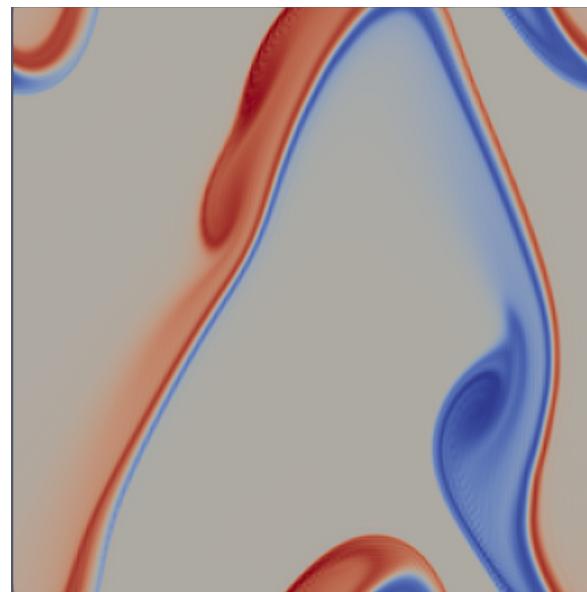


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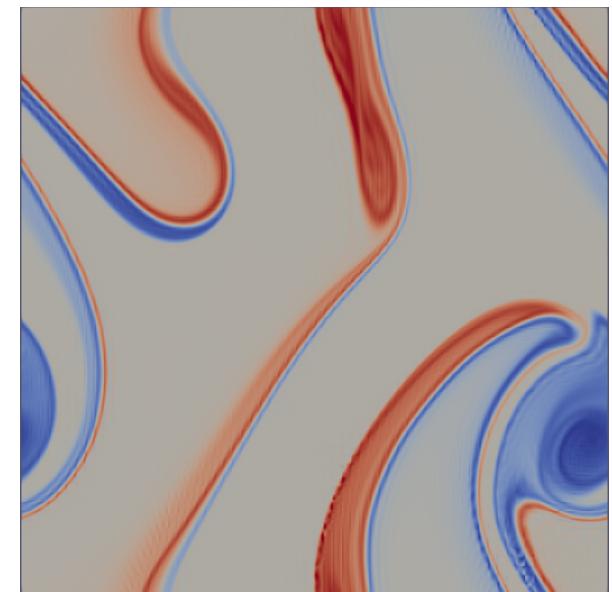
Euler: g=100,p=4,n=256



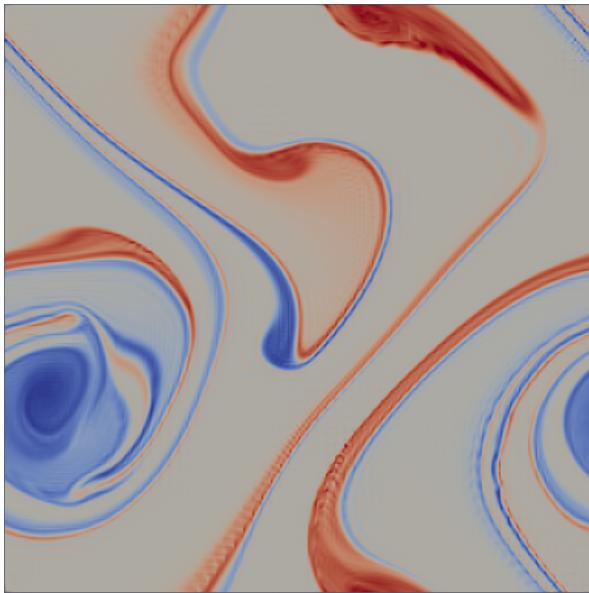
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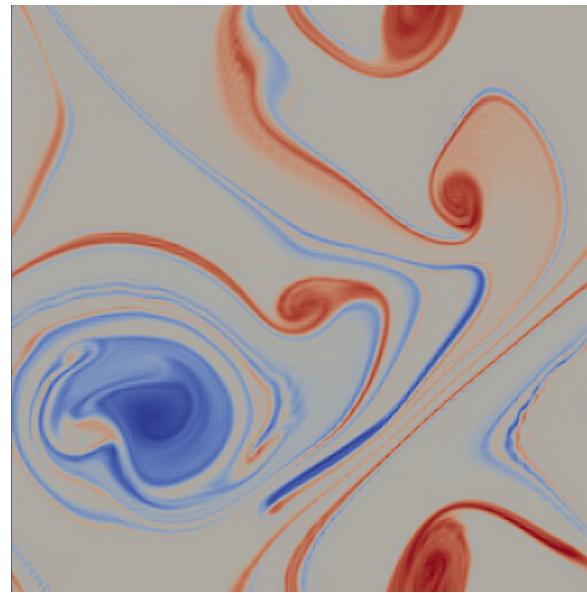
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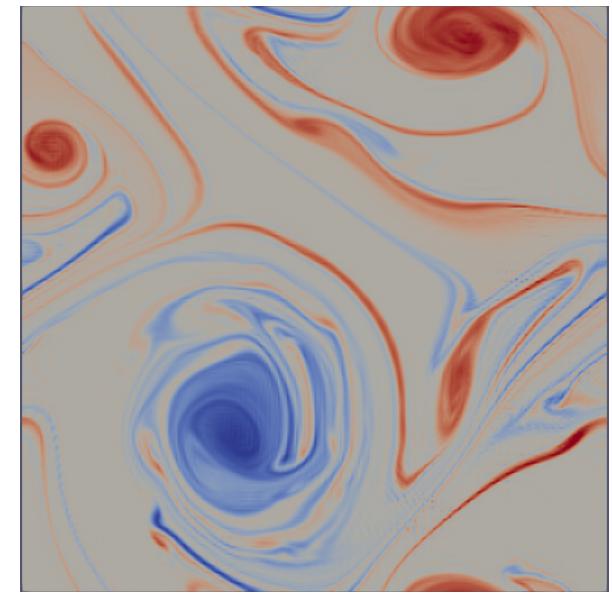
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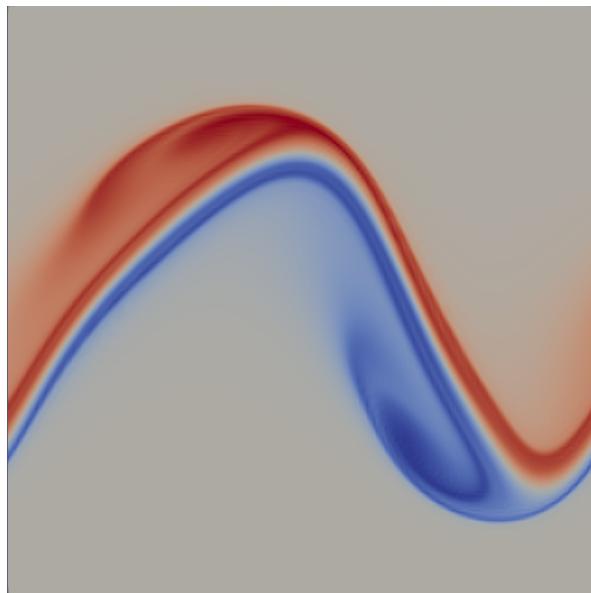


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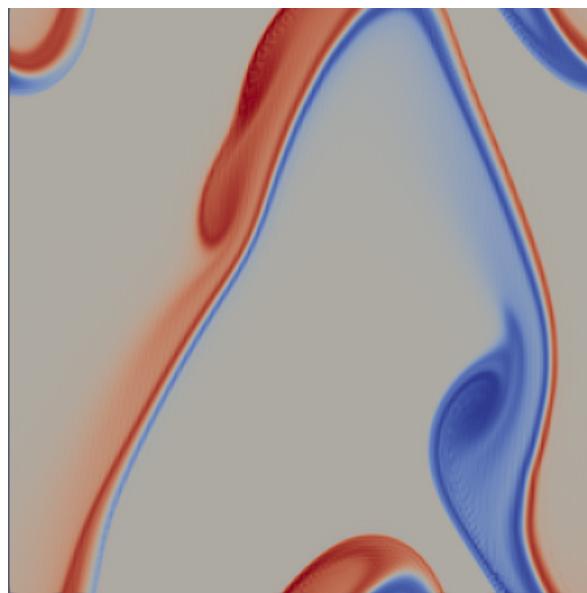


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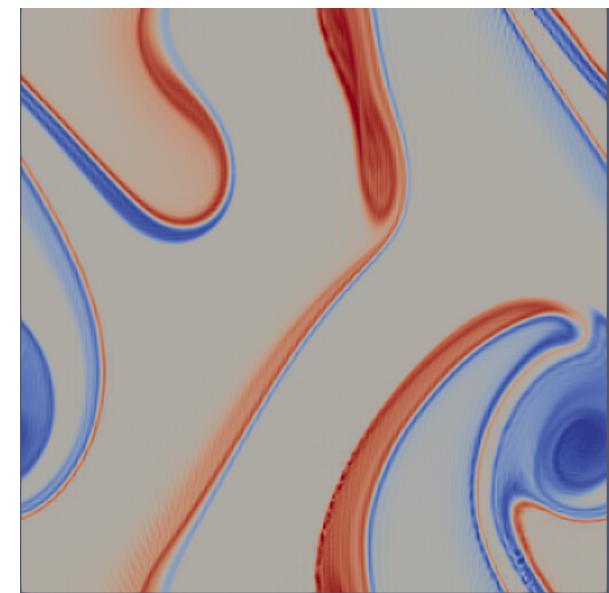
Euler: g=1000,p=4,n=256



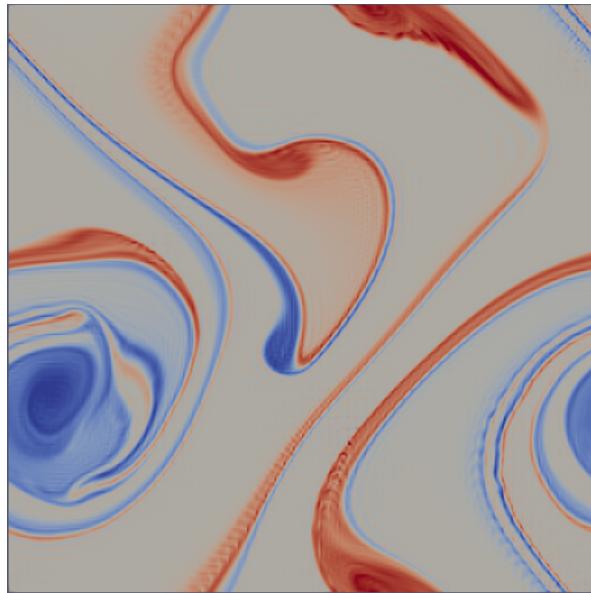
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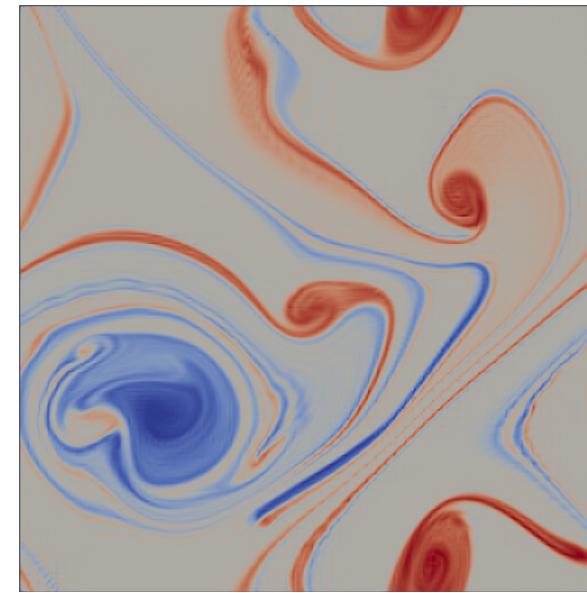
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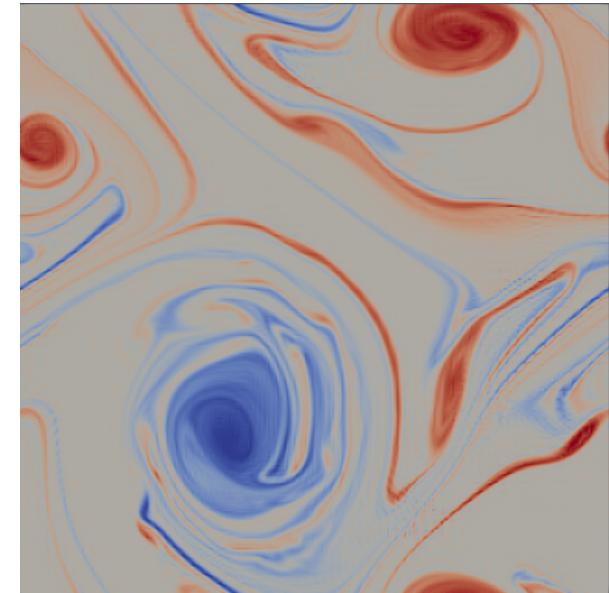
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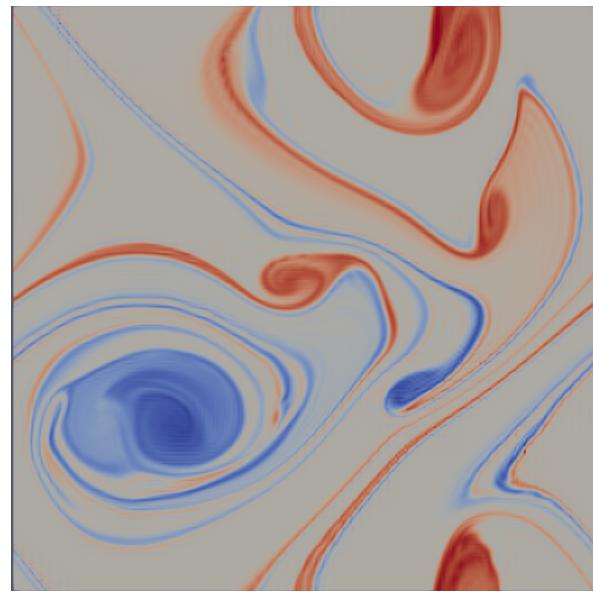


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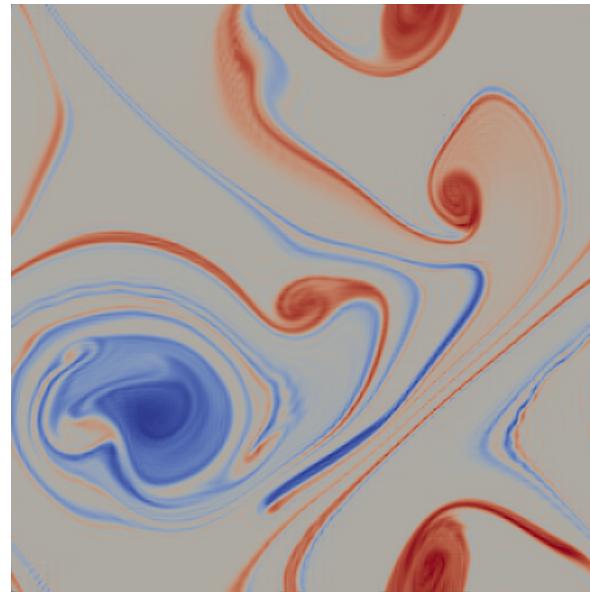


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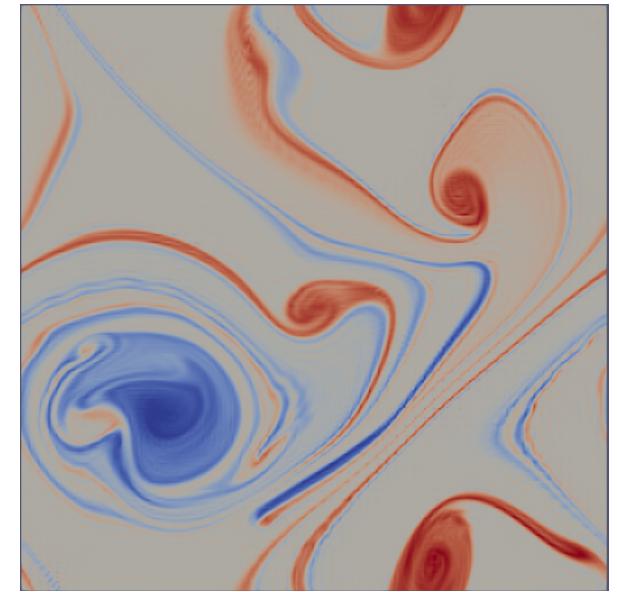
Euler: $g=10$, 100 , and 1000



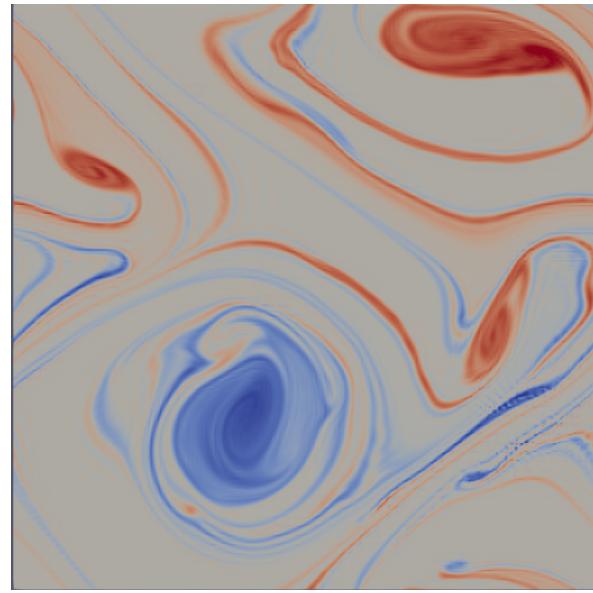
$g=10$



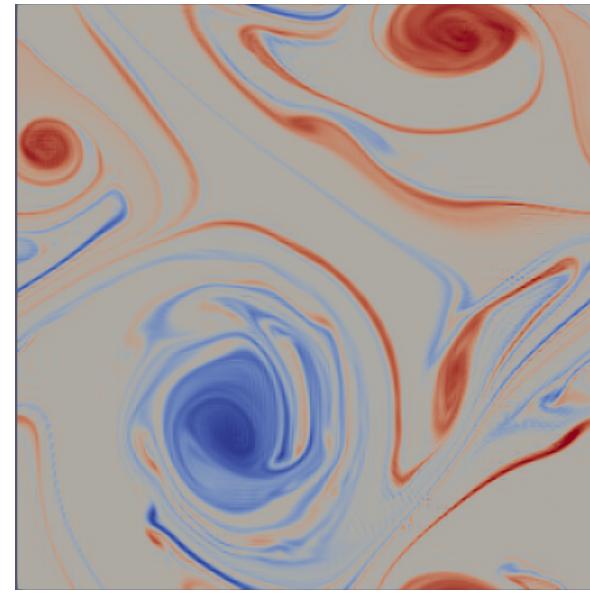
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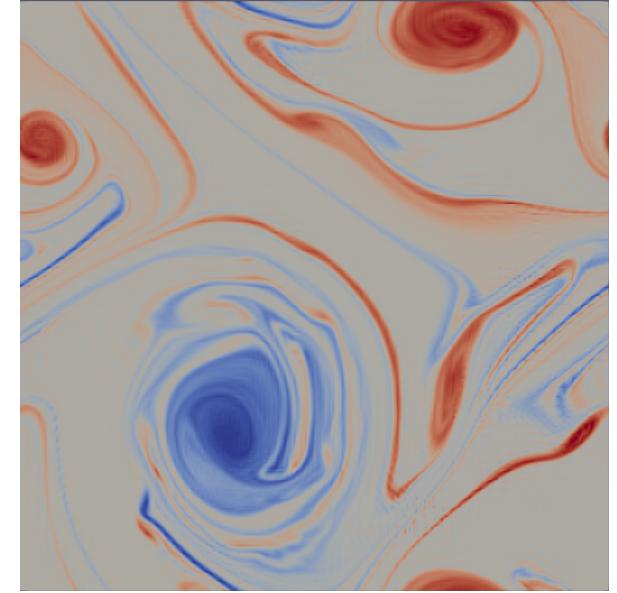
$g=1000$



$g=10$



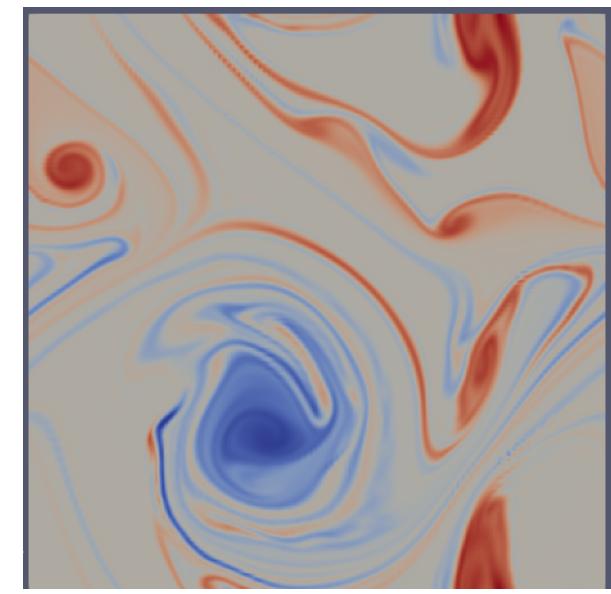
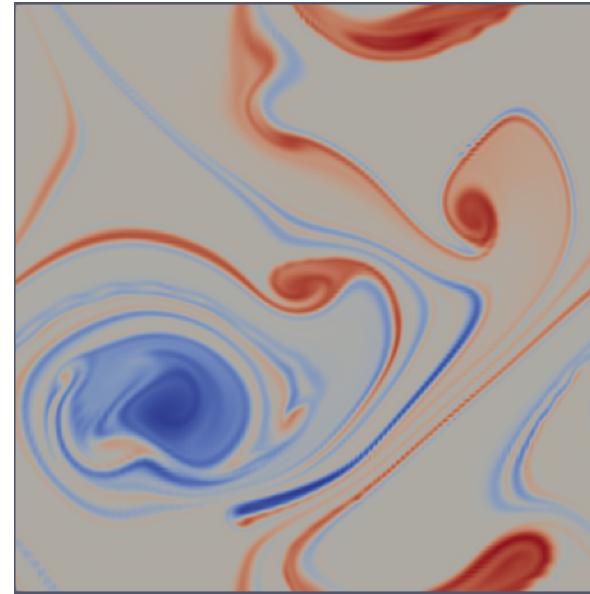
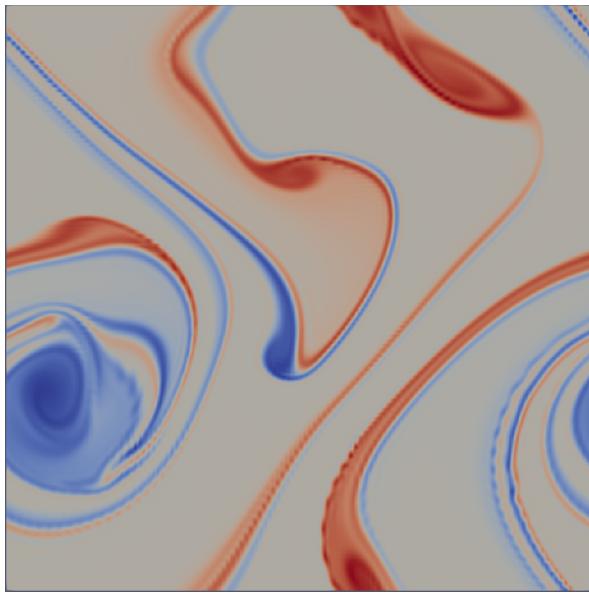
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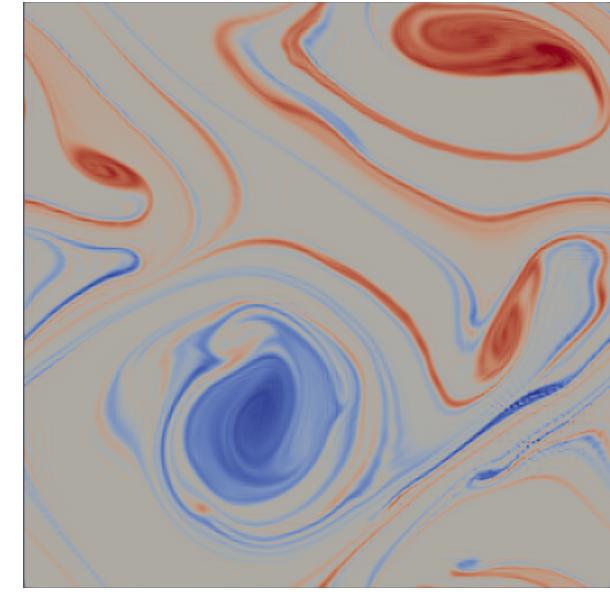
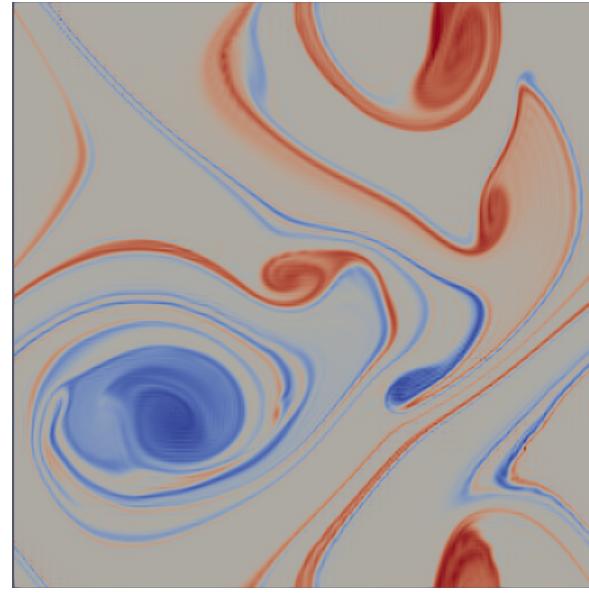
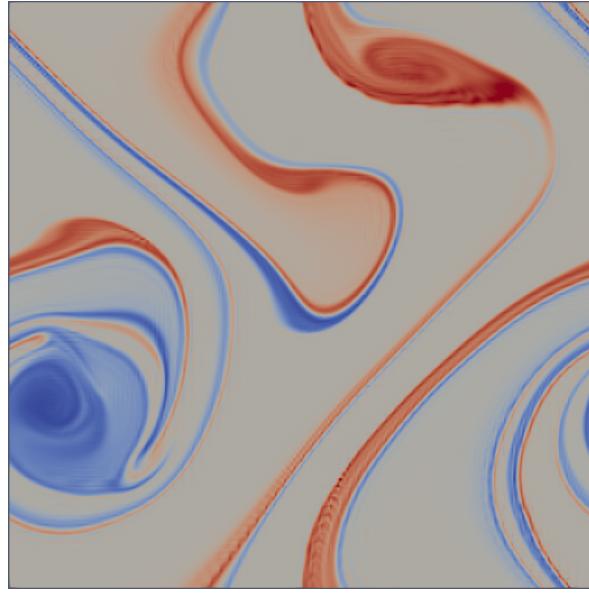
$g=1000$

Shallow Water vs Euler for $g=10$

Shallow water equations



Euler equations



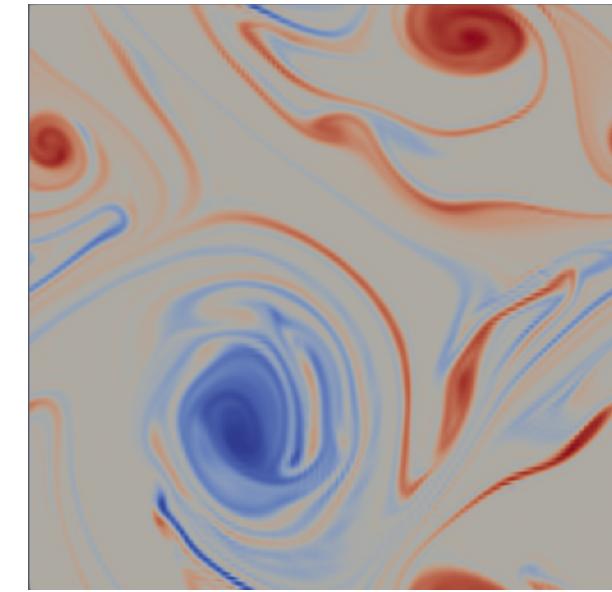
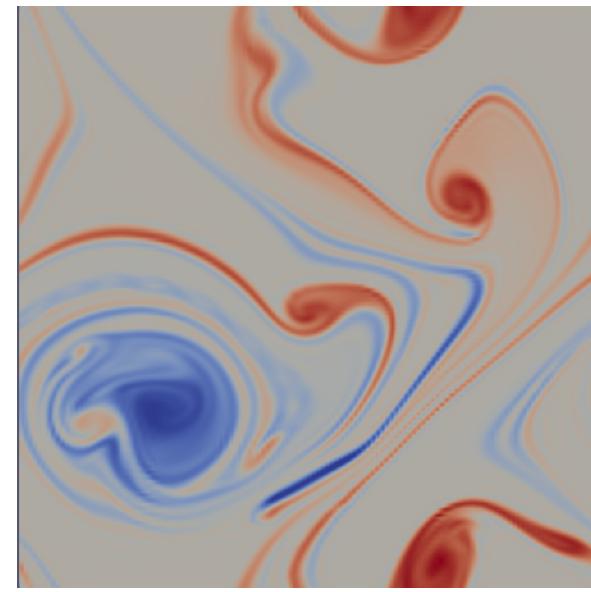
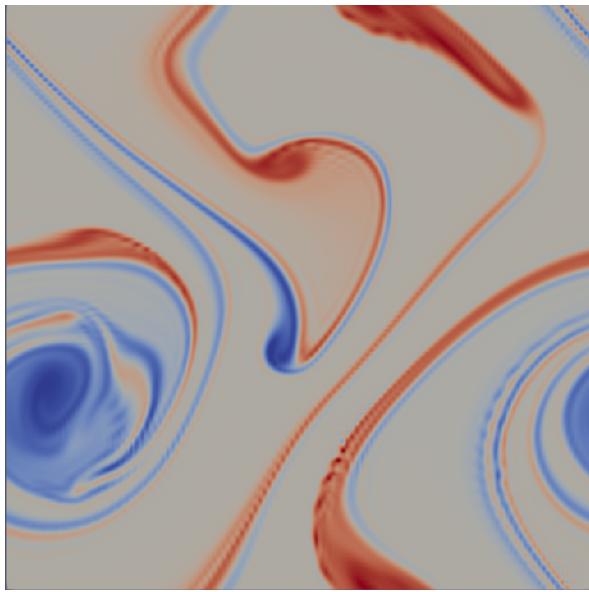
$t=72$

$t=84$

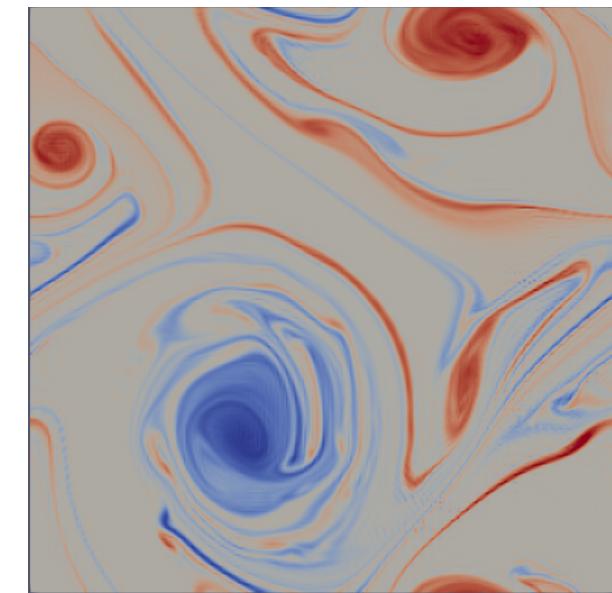
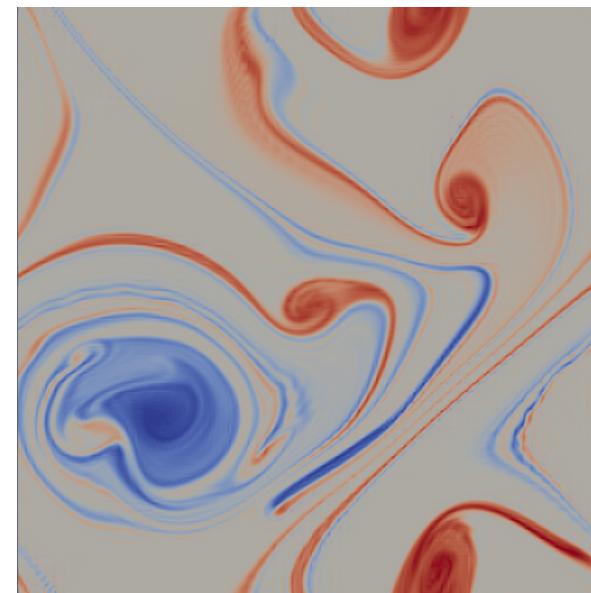
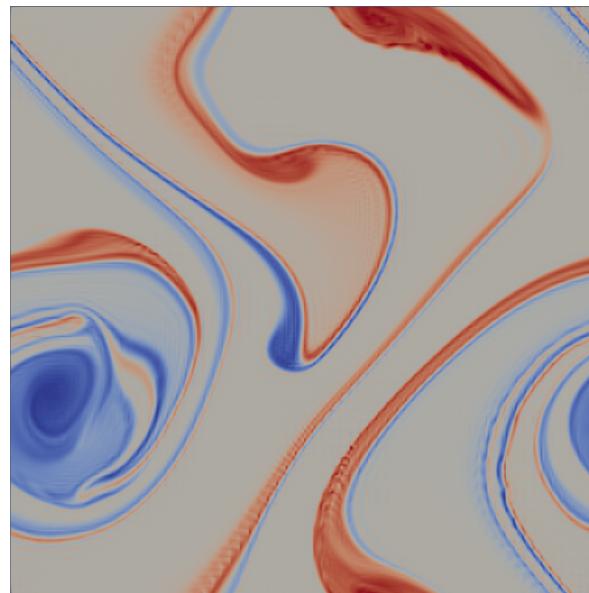
$t=96$

Shallow Water vs Euler for $g=100$

Shallow water equations



Euler equations



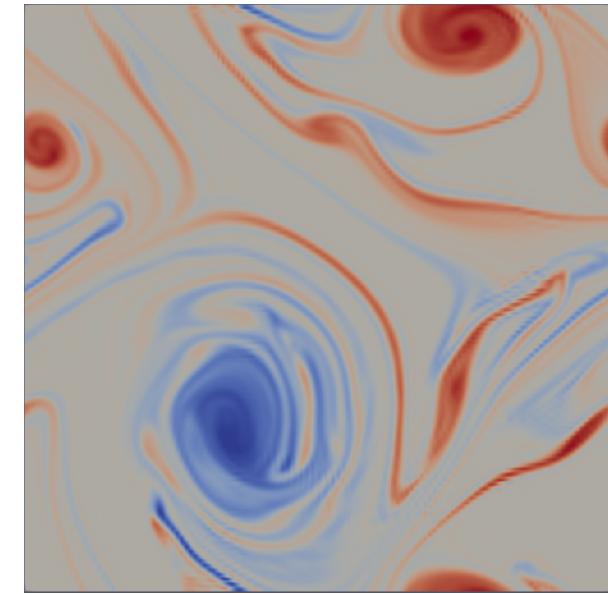
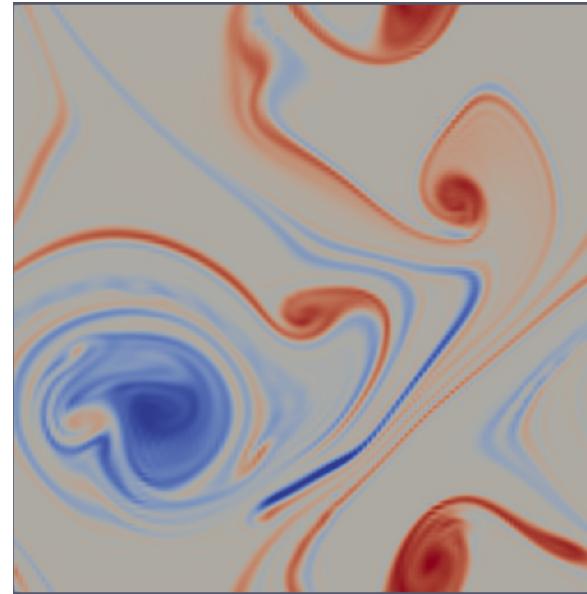
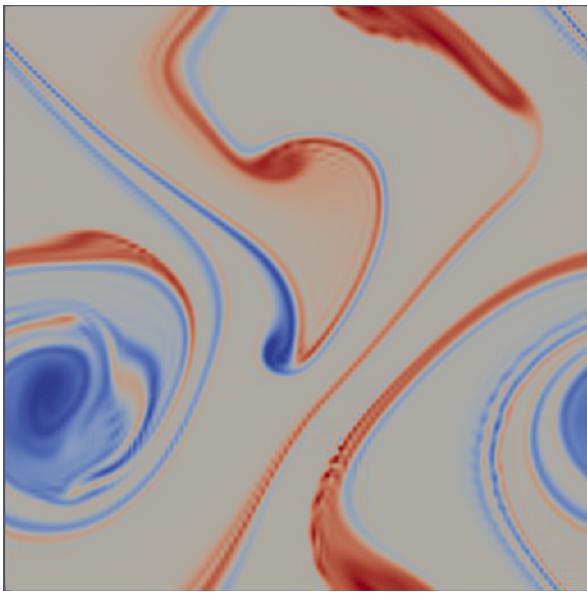
$t=72$

$t=84$

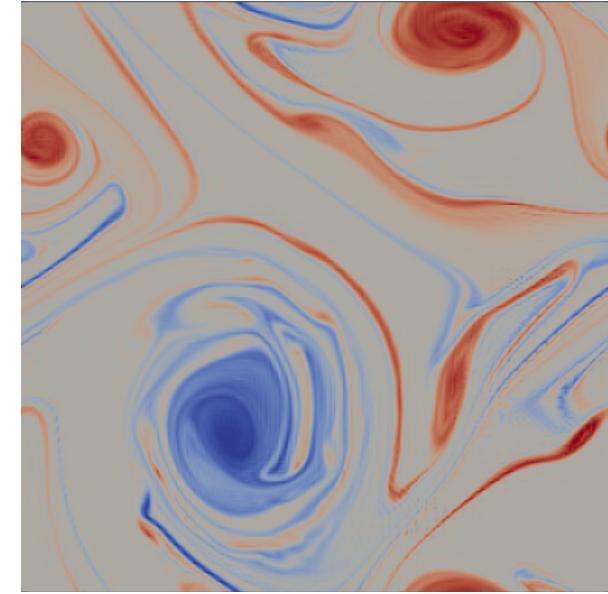
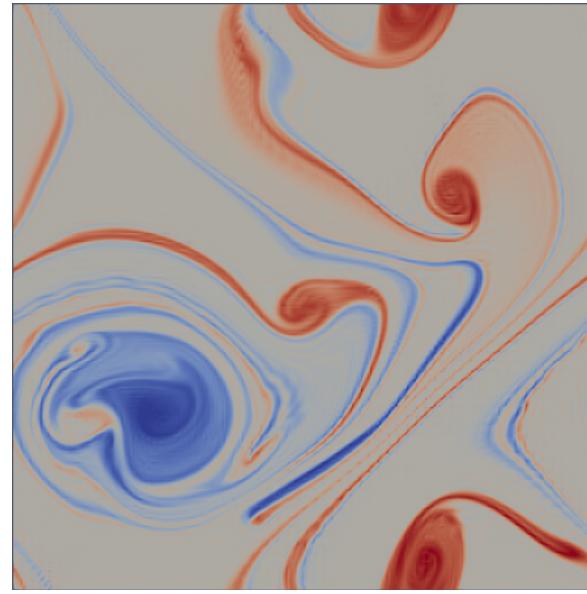
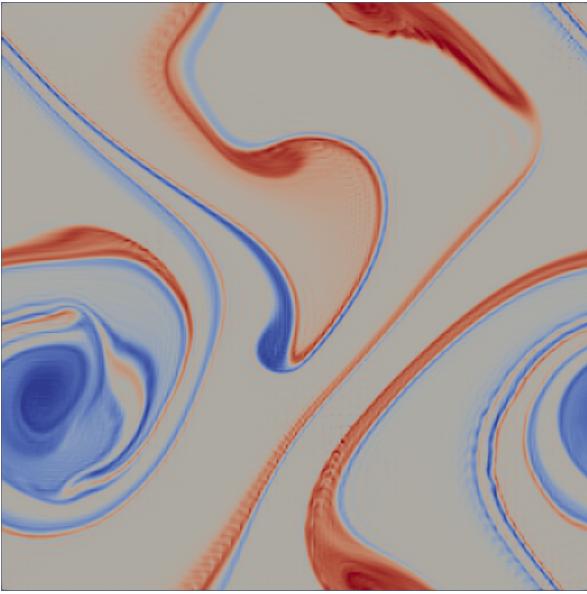
$t=96$

Shallow Water vs Euler for $g=1000$

Shallow water equations



Euler equations

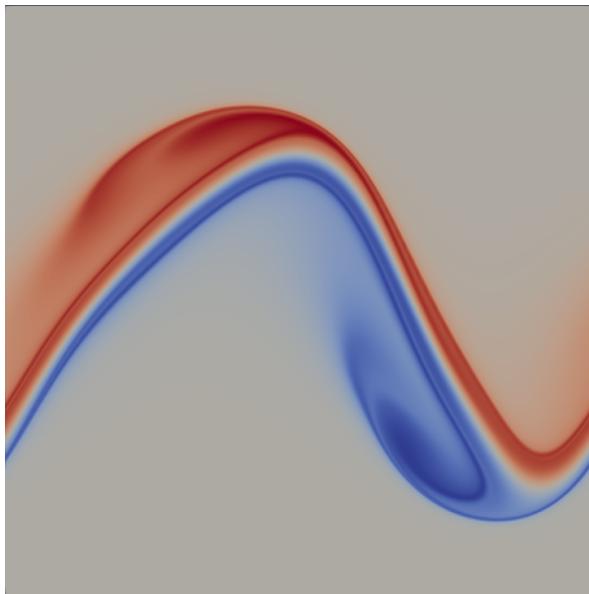


$t=72$

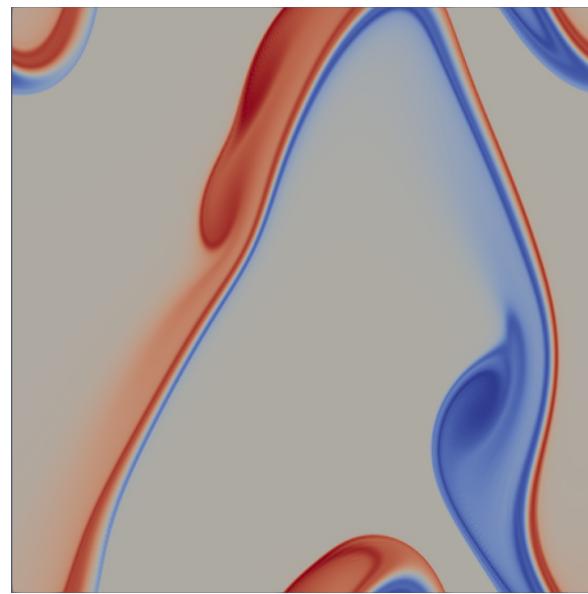
$t=84$

$t=96$

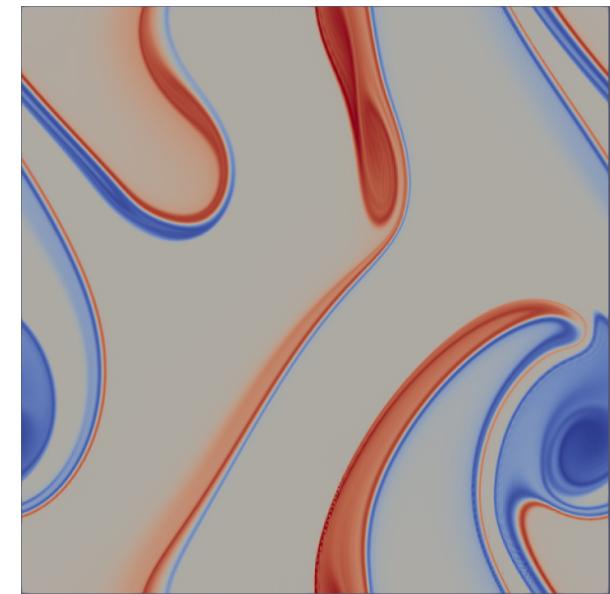
Euler: g=100,p=4,n=512



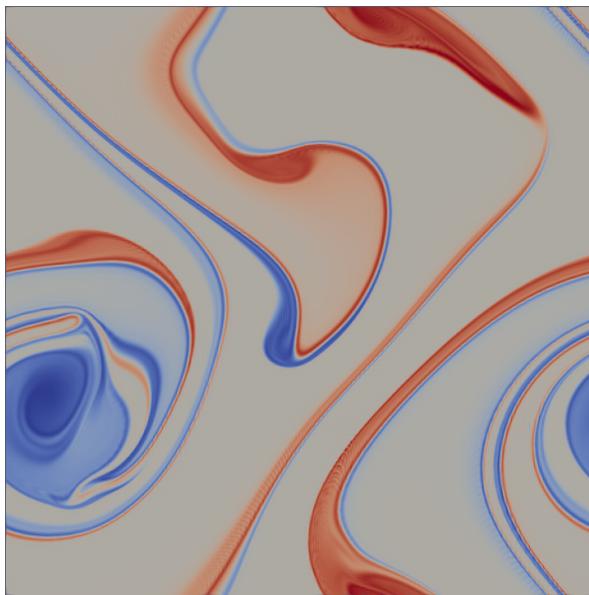
$t=36$



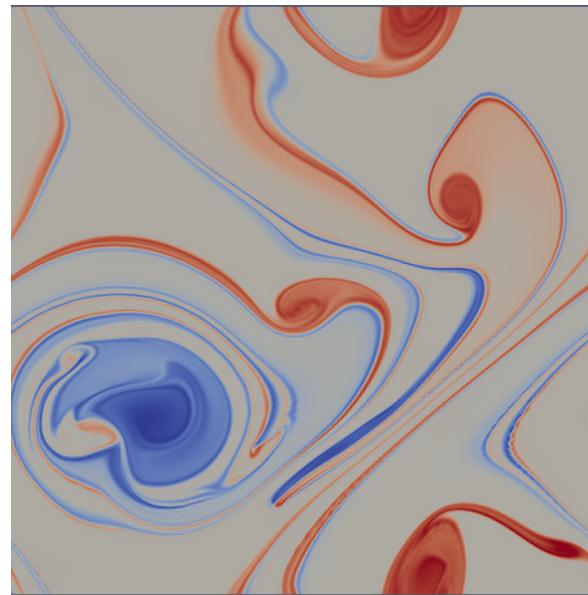
$t=48$



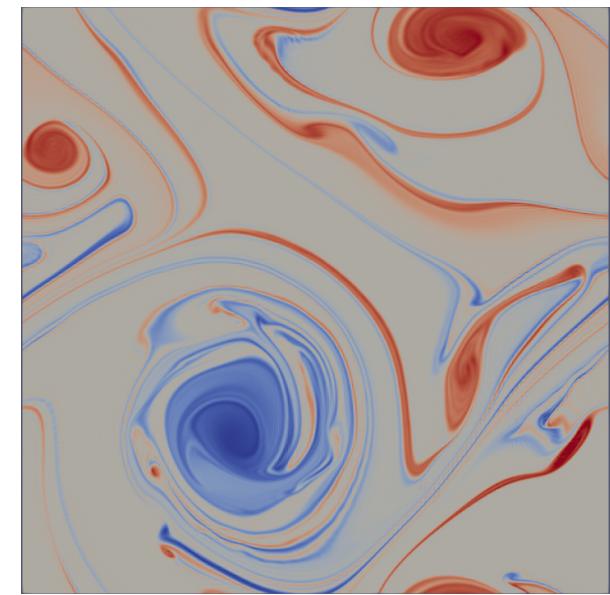
$t=60$



$t=72$

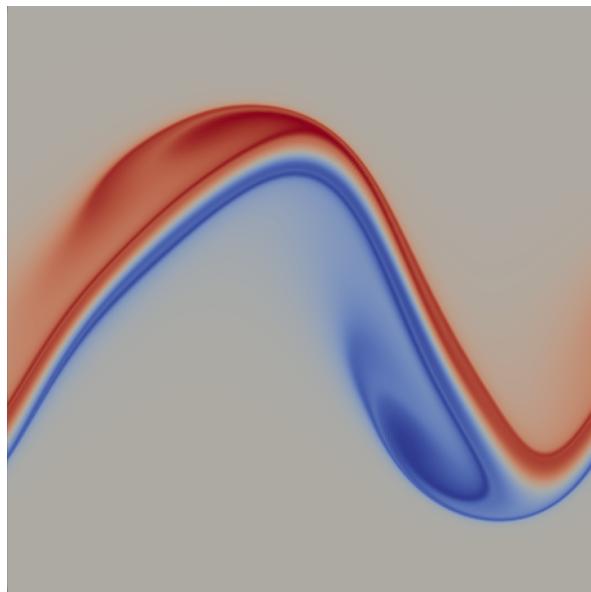


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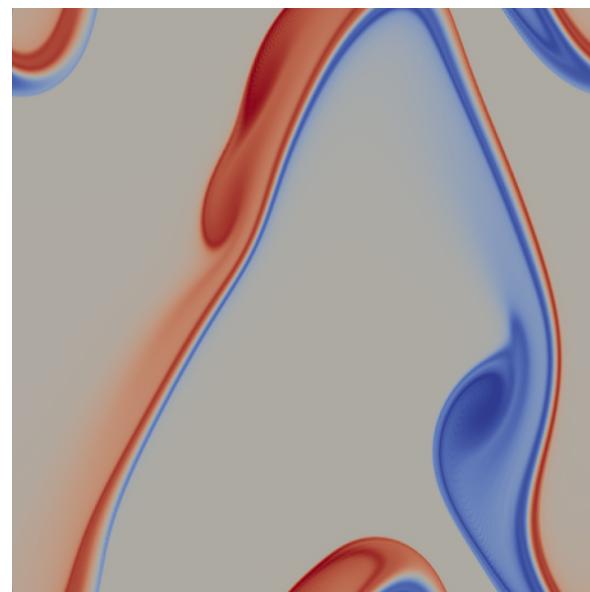


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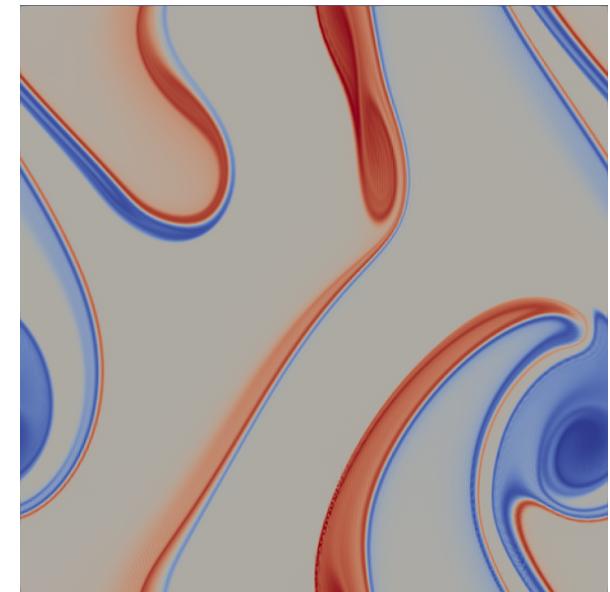
Euler: g=1000,p=4,n=512



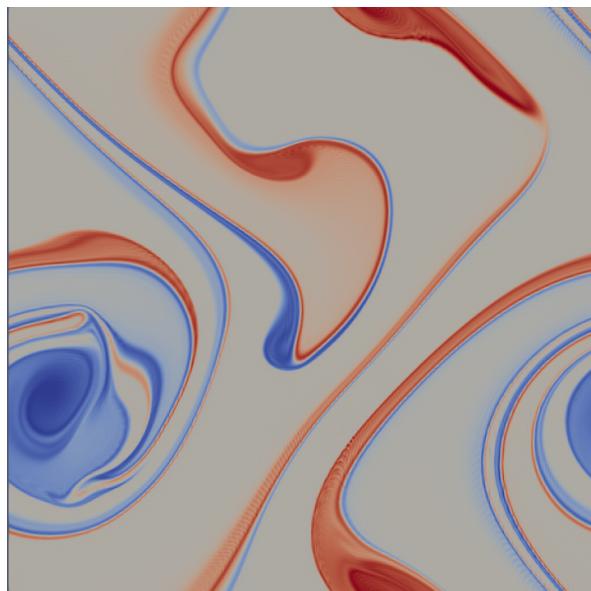
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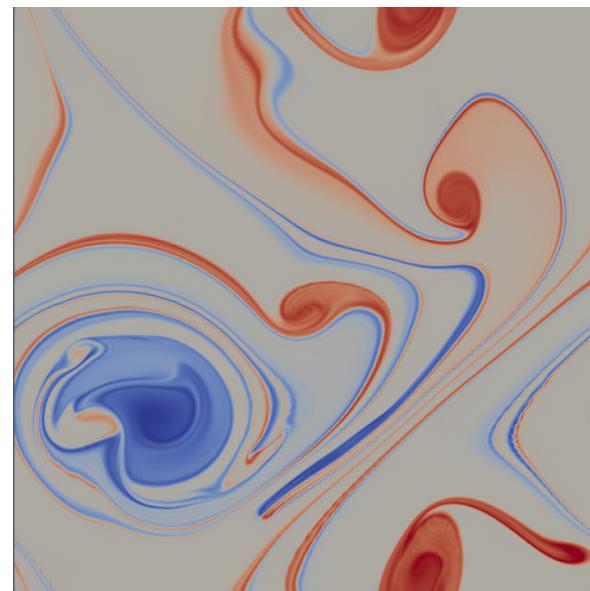
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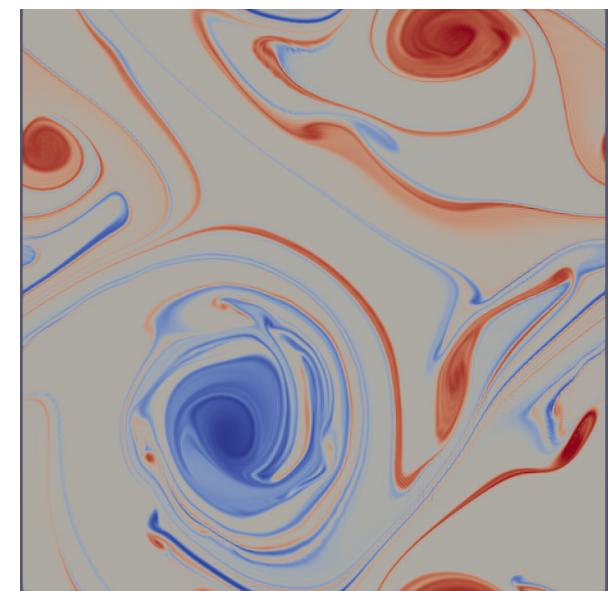
$t=60$



$t=72$



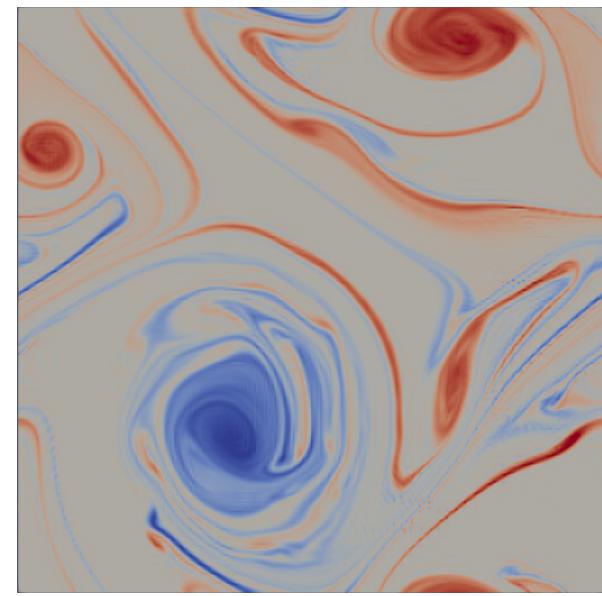
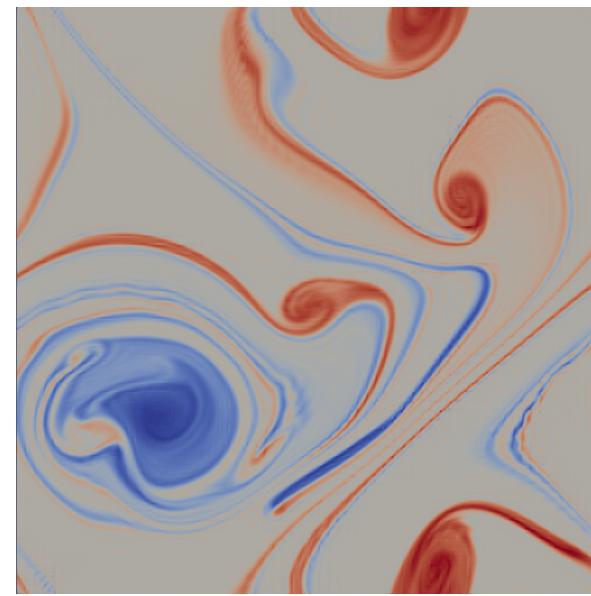
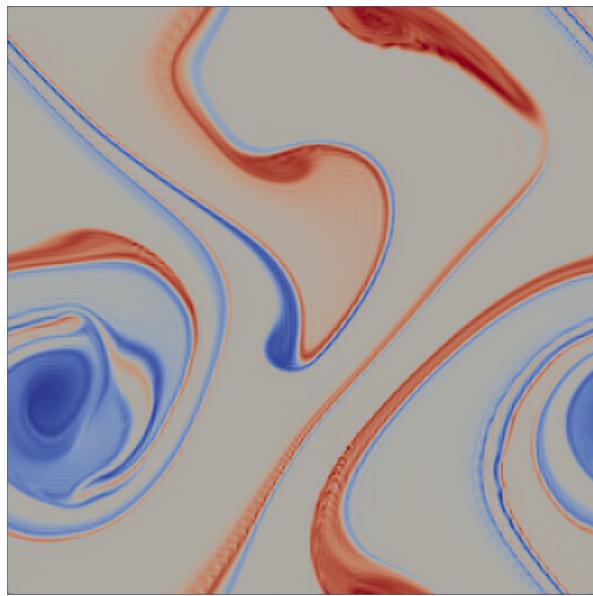
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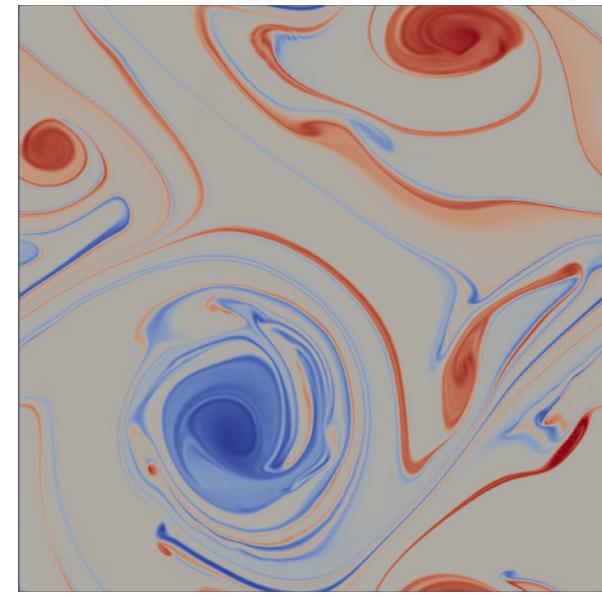
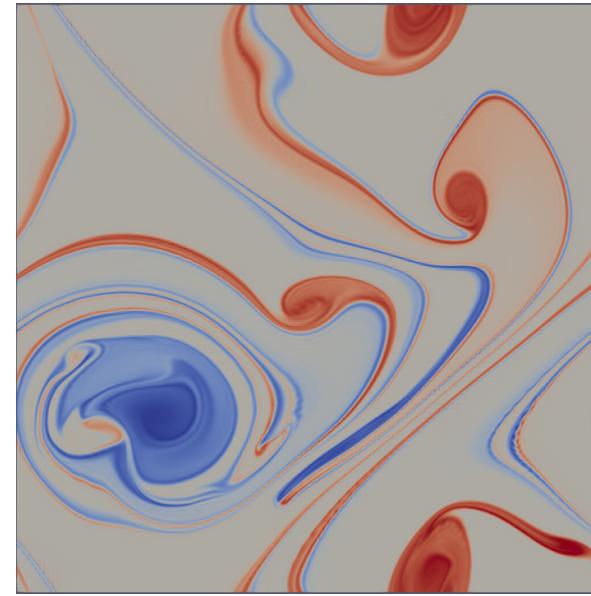
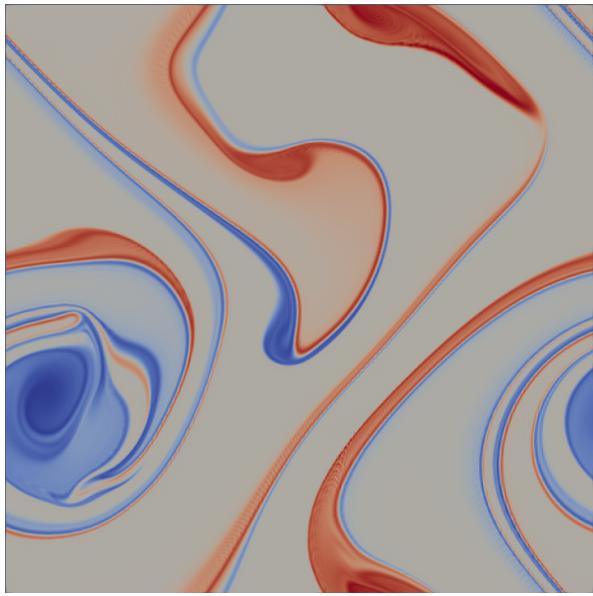
$t=96$

Euler: $g=100, p=4, n=256$ vs $n=512$

$n=256$



$n=512$



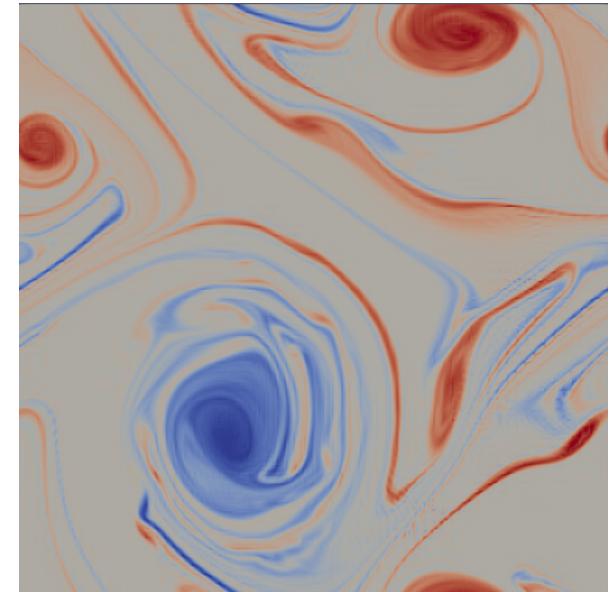
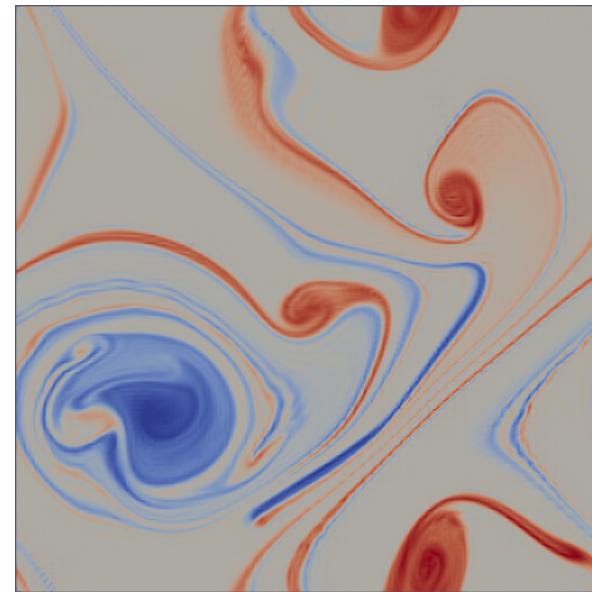
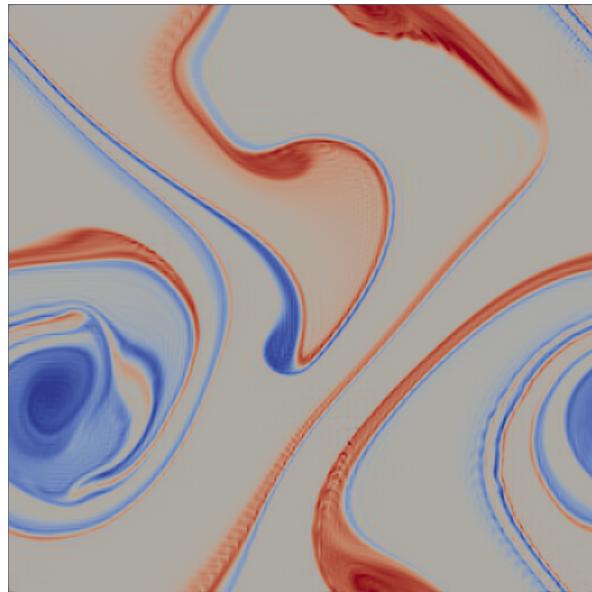
$t=72$

$t=84$

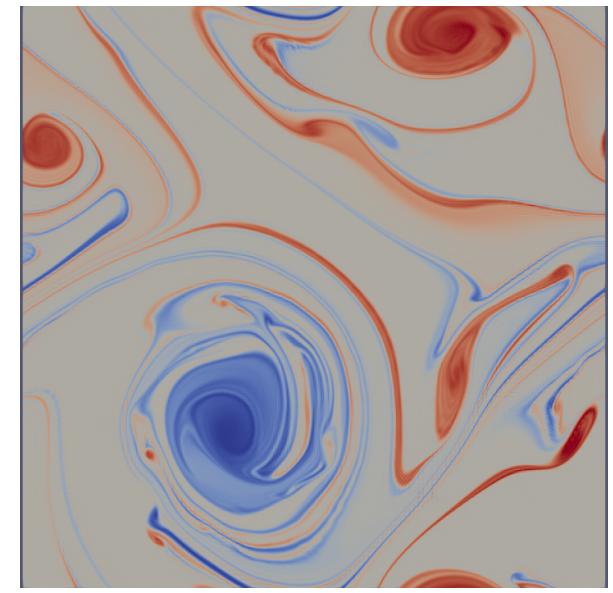
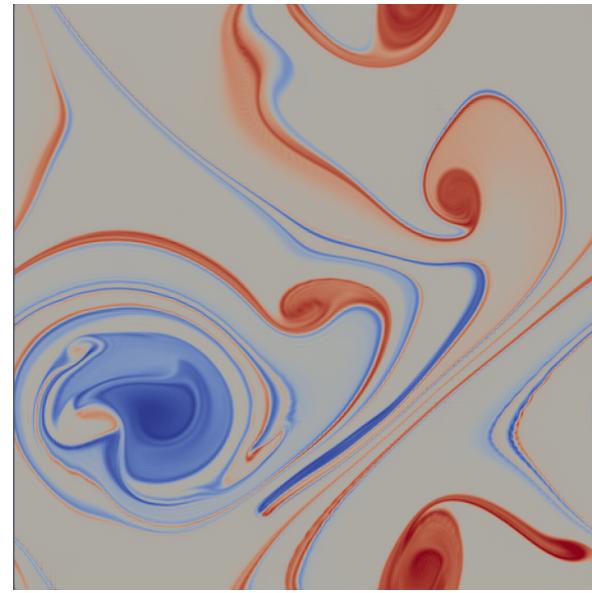
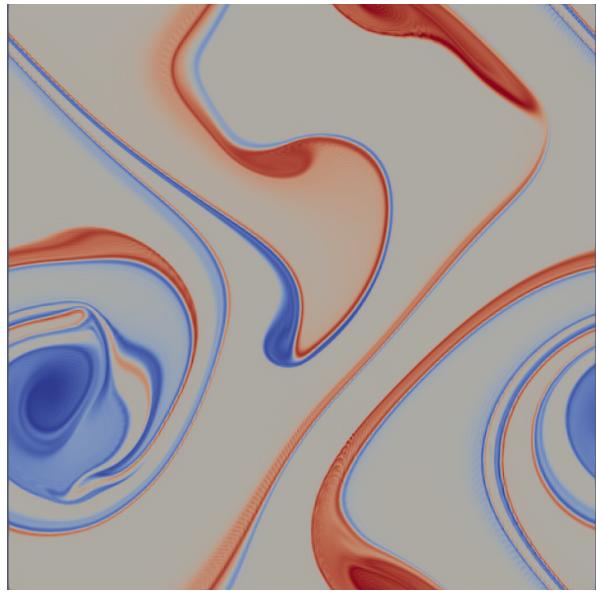
$t=96$

Euler: $g=1000, p=4, n=256$ vs $n=512$

$n=256$



$n=512$



$t=72$

$t=84$

$t=96$

Conclusions

- The shallow water equations and nearly incompressible Euler equations seem to match well for $g > 100$.
- The results are sensitive to g when g is small (i.e. $g < 100$). For large enough g , the results are consistent across different models and resolutions.
- Exasim runs smoothly for all cases without physical/artificial diffusion and yields convergent results when increasing the resolution from 256 to 512.
- There are some slight differences between Exasim's results and Oceananigans' results for $t > 80$.