

Scientific Machine Learning Final Project

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Finite Element Method

$$\frac{U^{n+1} - U^n}{\Delta t} = \nabla \cdot \Sigma \nabla U^{n+1} - f(U^n).$$

$$\Sigma_d = 10$$

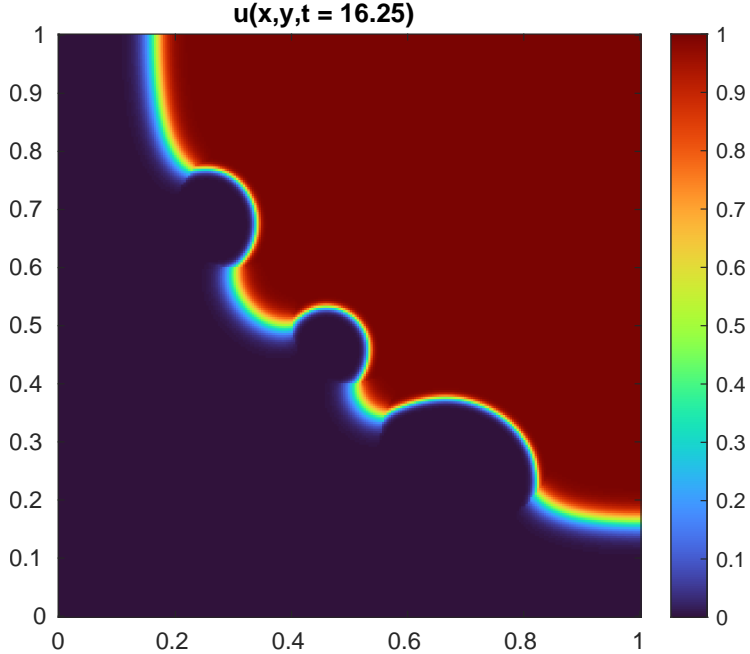
Δt	n_e	Activation time	M-matrix?	$u \in [0, 1]$
0.1	64	28.60	true	false
0.1	128	29.10	true	false
0.1	256	29.20	true	false
0.05	64	26.60	false	false
0.05	128	27.15	true	true
0.05	256	27.20	true	true
0.025	64	25.60	false	false
0.025	128	26.10	true	true
0.025	256	26.175	true	true

$$\Sigma_d = 1$$

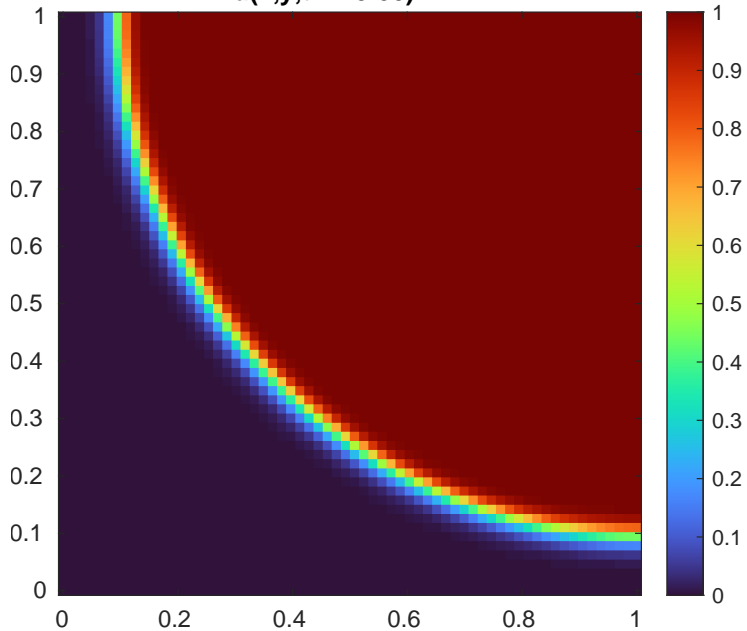
Δt	n_e	Activation time	M-matrix?	$u \in [0, 1]$
0.1	64	30.20	true	false
0.1	128	30.90	true	false
0.1	256	31.00	true	false
0.05	64	28.10	false	false
0.05	128	28.80	true	true
0.05	256	28.90	true	true
0.025	64	27.025	false	false
0.025	128	27.70	true	true
0.025	256	27.775	true	true

$$\Sigma_d = 0.1$$

Δt	n_e	Activation time	M-matrix?	$u \in [0, 1]$
0.1	64	31.70	false	false
0.1	128	32.50	false	false
0.1	256	32.60	true	false
0.05	64	29.55	false	false
0.05	128	30.25	false	false
0.05	256	30.40	false	true
0.025	64	28.40	false	false
0.025	128	29.075	false	false
0.025	256	29.225	false	true



$u(x,y,t = 19.00)$



$u(x,y,t = 14.00)$

