

Assignment 4 - Time-dependent problems

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Submission Deadline: We 15 December, 10am

Consider a square plate with sides $[-1, 1] \times [-1, 1]$. At time $t = 0$ we are heating the plate up such that the temperature is $u = 5$ on one side and $u = 0$ on the other sides. The temperature evolves according to $u_t = \Delta u$. At what time t^* does the plate reach $u = 1$ at the center of the plate? Implement a finite difference scheme and try with explicit and implicit time-stepping. By increasing the number of discretisation points demonstrate how many correct digits you can achieve. Also, plot the convergence of your computed time t^* against the actual time. To 12 digits the wanted solution is $t^* = 0.424011387033$.

A GPU implementation of the explicit time-stepping scheme is not necessary but would be expected for a very high mark beyond 80%.

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