



Solving the Schrödinger Equation Using Mimetic Differences

Mani Amani and Miguel A. Dumett

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**SAN DIEGO STATE
UNIVERSITY**

Computational Science Research Center
College of Sciences
5500 Campanile Drive
San Diego, CA 92182-1245
(619) 594-3430




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53
54 % Visualization
55 figure(1);
56 surf(X, Y, real(U_matrix)); %Both real part and imaginary parts
    can be depicted, use imag() for imaginary
57 title(['Mimetic Solution at Time = ', num2str(t, '%.4f')]);
58 xlabel('x'); ylabel('y'); zlabel('Real(U)');
59 zlim([-1, 1]);
60 drawnow;
61
62 % Capture and save frame
63 %frame = getframe(gcf);
64 %writeVideo(v, frame);
65
66 % Error calculation
67 U_analytical = X.^2 .* Y.^2 .* exp(1i * t);
68 errors(ii+1) = norm(real(U_matrix) - real(U_analytical), 'inf');
69
70 % Save figure at time t = 1s, Just to get the Last frame for
    reference
71 if abs(t - 1.0) < 0.0005 %Some tolerance, can be changed
    depending on the desired time
72     savefig(gcf, 'Figure_at_Time_1.fig'); %Figure name
73     print('Figure_at_Time_1', '-dpng');
74 end
75
76 U_old = U_new; %Update the vector for further calculation
77 end
78
79 % Close video and display info
80 %close(v);
81 disp(['Video saved as ', videoFile]);
82 disp('Maximum error at any timestep:');
83 max(errors)
84 figure;
85 plot(errors);
86 title('Error over Time');
87 xlabel('Time Step');
88 ylabel('Max Absolute Error');

```