CAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The developed formulation has been proposed for solving coupled nonlinear reaction diffusion equations using moving Kriging nodal shape function with temporal discretization by the Euler, Runge–Kutta and Crank-Nicolson methods. This robust method works well in the sense of accuracy. For example1 with $\Delta t = 0.01$, the MLPG method with temporal discretization by the Euler, Runge–Kutta and Crank-Nicolson methods obtained the accuracy of the estimation. However, the Runge–Kutta and Crank-Nicolson methods have more accuracy than the Euler method. In case of $\Delta t = 0.1$, the solution of u and v using the Euler and Runge–Kutta methods are unstable because increasing of Δt effects the accuracy of the estimation. Nevertheless, the MLPG method with temporal discretization by the Crank-Nicolson works well for this problem by using $\Delta t = 0.1$. By using the Brusselator model problem with the unknown exact solution, we found that the developed formulation has obtained the steady state values. For known exact solutions, there are errors near the boundary area. In future work, we will develop formulation for solving these problems.

Moreover, the experimental results by the MLPG5 method based on the radial point interpolation method and the MLPG4 method based on moving Kriging approximation work well and are similar to the MLPG5 method based on the moving Kriging approximation method. That means the developed formulation with the radial point interpolation and moving Kriging method have a good efficiency for solving coupled nonlinear reaction-diffusion equations. Although the efficiency of both the developed MLPG4 and MLPG5 methods is rather good, the computational cost of the developed MLPG4 method is more than the developed MLPG5 method.

5.2 Recommendations

1. In future works, the MLPG formulations will be developed for solving couple nonlinear reaction-diffusion equations in 3-dimensional spaces which satisfy physics and engineer problems.

2. The developed formulation can be applied for solving the other form of couple nonlinear reaction-diffusion equations such as coupled nonlinear Bugers'system that is a fundamental partial differential equation from fluid mechanics.