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EXISTENCE OF SOLUTIONS FOR THE DISCRETE COAGULATION-FRAGMENTATION MODEL WITH DIFFUSION

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Dedicated to Olga Ladyzhenskaya

1. Introduction

We consider the following infinite system of reaction-diffusion equations:

$$\begin{aligned}
\frac{\partial u_1}{\partial t} &= d_1 \Delta u_1 - u_1 \sum_{j=1}^{\infty} a_{1j} u_j + \sum_{j=1}^{\infty} b_{1j} u_{1+j}, \\
\frac{\partial u_i}{\partial t} &= d_i \Delta u_i + \frac{1}{2} \sum_{j=1}^{i-1} (a_{i-j,j} u_{i-j} u_j - b_{i-j,j} u_i) \\
&\quad - u_i \sum_{j=1}^{\infty} a_{ij} u_j + \sum_{j=1}^{\infty} b_{ij} u_{i+j}, \quad i = 2, 3, \ldots,
\end{aligned} \tag{1.1}$$

on $\Omega_T = \Omega \times (0, T)$, subject to the initial condition

$$u_i(0, x) = U_i(x) \quad \text{for } x \in \Omega,\ i = 1, 2, \ldots \tag{1.2}$$

and Neumann boundary condition

$$\frac{\partial u_i}{\partial \nu} = 0 \quad \text{on } \partial\Omega \times (0, T),\ i = 1, 2, \ldots, \tag{1.3}$$

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