**Collective diffusion in an ordered adsorbate: kinetic lattice gas
model approach** ZBIGNIEW W. GORTEL, University of Alberta, MAGDALENA
A. ZAŁUSKA–KOTUR, Polish Academy of Sciences — An approach to microscopic
kinetics of an interacting lattice gas is proposed to derive an algebraic expression
for the coverage dependence of the collective diffusion coefficient in an adsorbate,
ordered by strong adatom–adatom repulsive intractions, populating a square lattice
of adsorption sites. The starting point are Markovian Master equations for the time
dependent probabilities of all accessible microstates of the gas in which jumps of
adatoms from occupied to empty adsorption sites are accounted for. The transition
rates between the microstates depend on the occupancy state of the adsorption
sites around the jumping adatom. The diffusion coefficient is extracted from the
lowest eigenvalue of a non–hermitian rate matrix in the long wavelength limit. The
eigenvalue is evaluated using an anzatz for the left and the right eigenvectors of
the rate matrix with the adsorbate ordering inscribed into the structure of the
eigenvectors. Analytic results which have not been obtained yet by any other method
are validated by Monte Carlo simulations of the diffusion process.

Zbigniew W. Gortel
University of Alberta