Alleles dynamics

I write the differential equation for the allele in a diploid population, so that I write the alleles dynamic far from Hardy-Weinberg equilibrium

I assume that the differential equation for the allele is like a chemical equations, where the alleles are the chemical substance and the reaction is a male-female mating.

I write the population gene diffusion of two alleles probability, when two parents have two offspring (I use a fixed number of offspring for mating, to simplify the problem):

$$
\begin{array}{llll}
AA + AA & \rightarrow & (AA + AA + AA + AA)/2 & \rightarrow \ AA + AA \ (\textit{no gene reaction}) \\
AA + Aa & \rightarrow & (AA + Aa + AA + Aa)/2 & \rightarrow \ AA + Aa \ (\textit{no gene reaction}) \\
AA + aa & \rightarrow & (Aa + Aa + Aa + Aa)/2 & \rightarrow \ 2Aa \\
 & & & \\
2Aa + 2Aa & \rightarrow & (AA + Aa + aA + aa) & \rightarrow \ AA + 2Aa + aa \\
Aa + aa & \rightarrow & (Aa + Aa + aa + aa)/2 & \rightarrow \ Aa + aa \ (\textit{no gene reaction}) \\
 & & & \\
aa + aa & \rightarrow & (aa + aa + aa + aa)/2 & \rightarrow \ aa + aa \ (\textit{no gene reaction})
\end{array}
$$

the discrete equation for the gene variations are:

$$
\begin{array}{l}
AA(t+1) = AA(t) - AA(t)\ aa(t) + Aa(t)^2/2 \\
Aa(t+1) = Aa(t) + 2\ AA(t)\ aa(t) - Aa(t)^2 \\
aa(t+1) = aa(t) - AA(t)\ aa(t) + Aa(t)^2/2
\end{array}
$$

there is the invariance of the sum of the alleles $AA(t+1) + Aa(t+1) + aa(t+1) = AA(t) + Aa(t) + aa(t) = 1$, so this is a probability dynamics.

The differential equation for continuous process is:

$$
\begin{array}{l}
\frac{d\ AA}{dt} = -AA\ aa + Aa^2/2 \\
\frac{d\ Aa}{dt} = 2\ AA\ aa - Aa^2/2 \\
\frac{d\ aa}{dt} = -AA\ aa + Aa^2/2
\end{array}
$$

I think that can be used to study the alleles dynamics for new genetic diseases far from the equilibrium.