Ultimately boundedness and nonlinear stability for a P.D.E.s reaction-diffusion SEIR model

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Numerous contributions to mathematical theory of epidemics have been given in the last years (cfr. [1]-[21] and the references therein). In [2, 9, 21], the host population is supposed to be divided into three disjoint classes: $S(t)$, the individuals susceptible to infection, $I(t)$, the infectious individuals and $R(t)$, the removed ones. In [14]-[16],[20] a further class has been considered: the exposed to the infection, i.e. individuals in the latent state $E(t)$. A key role in epidemic models is played by the so called force of infection, or incidence rate, i.e. the function describing the mechanism of transmission of the disease. We deal with a SEIR reaction-diffusion model having the well known and meaningful incidence rate

$$g(S,I) = KIS(1 + \alpha I),$$  

(1)

$K$ and $\alpha$ being positive constants (cfr. [5]-[10] for details).

The longtime behaviour of the solutions is analyzed and, in particular, absorbing sets in the phase space are determined. By using a peculiar Lyapunov function, the nonlinear asymptotic stability of endemic equilibrium is investigated.


