# PHILOSOPHICAL TRANSACTIONS B

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# Research





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Subsection text here.

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## 2. Equations

Sample equations.

$$\begin{split} \frac{\partial u(t,x)}{\partial t} &= Au(t,x) \left(1 - \frac{u(t,x)}{K}\right) - B \frac{u(t-\tau,x)w(t,x)}{1 + Eu(t-\tau,x)},\\ \frac{\partial w(t,x)}{\partial t} &= \delta \frac{\partial^2 w(t,x)}{\partial x^2} - Cw(t,x) + D \frac{u(t-\tau,x)w(t,x)}{1 + Eu(t-\tau,x)}, \end{split} \tag{2.1}$$

$$\frac{dU}{dt} = \alpha U(t)(\gamma - U(t)) - \frac{U(t - \tau)W(t)}{1 + U(t - \tau)},$$

$$\frac{dW}{dt} = -W(t) + \beta \frac{U(t - \tau)W(t)}{1 + U(t - \tau)}.$$
(2.2)

$$\frac{\partial(F_1, F_2)}{\partial(c, \omega)} \Big|_{(c_0, \omega_0)} = \begin{vmatrix} \frac{\partial F_1}{\partial c} & \frac{\partial F_1}{\partial \omega} \\ \frac{\partial F_2}{\partial c} & \frac{\partial F_2}{\partial \omega} \end{vmatrix} \Big|_{(c_0, \omega_0)}$$

$$= -4c_0 q \omega_0 - 4c_0 \omega_0 p^2 = -4c_0 \omega_0 (q + p^2) > 0. \tag{2.3}$$

#### 3. Enunciations

**Theorem 3.1.** Assume that  $\alpha > 0, \gamma > 1, \beta > \frac{\gamma+1}{\gamma-1}$ . Then there exists a small  $\tau_1 > 0$ , such that for  $\tau \in [0, \tau_1)$ , if c crosses  $c(\tau)$  from the direction of to a small amplitude periodic traveling wave solution of (2.1), and the period of  $(\check{u}^p(s), \check{w}^p(s))$  is

$$\check{T}(c) = c \cdot \left[ \frac{2\pi}{\omega(\tau)} + O(c - c(\tau)) \right].$$

**Condition 3.1.** From (0.8) and (2.10), it holds  $\frac{d\omega}{d\tau} < 0$ ,  $\frac{dc}{d\tau} < 0$  for  $\tau \in [0, \tau_1)$ . This fact yields that the system (2.1) with delay  $\tau > 0$  has the periodic traveling waves for smaller wave speed c than that the system (2.1) with  $\tau = 0$  does. That is, the delay perturbation stimulates an early occurrence of the traveling waves.

# 4. Figures & Tables

The output for figure is:

Figure 1. Insert figure caption here

The output for table is:

Table 1. An Example of a Table

date	Dutch policy	date	European policy
1988	Memorandum Prevention	1985	European Directive (85/339)
1991–1997	Packaging Covenant I		
1994	Law Environmental Management	1994	European Directive (94/62)
1997	Agreement Packaging and Packaging Waste		

## 5. Conclusion

The conclusion text goes here.

Acknowledgements. Insert acknowledgment text here.

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## References

- 1. Allwood JM, Cullen JM. 2011 *Sustainable materials: with both eyes open*. Cambridge, UK: UIT Cambridge. See <a href="http://www.withbotheyesopen.com">http://www.withbotheyesopen.com</a>.
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