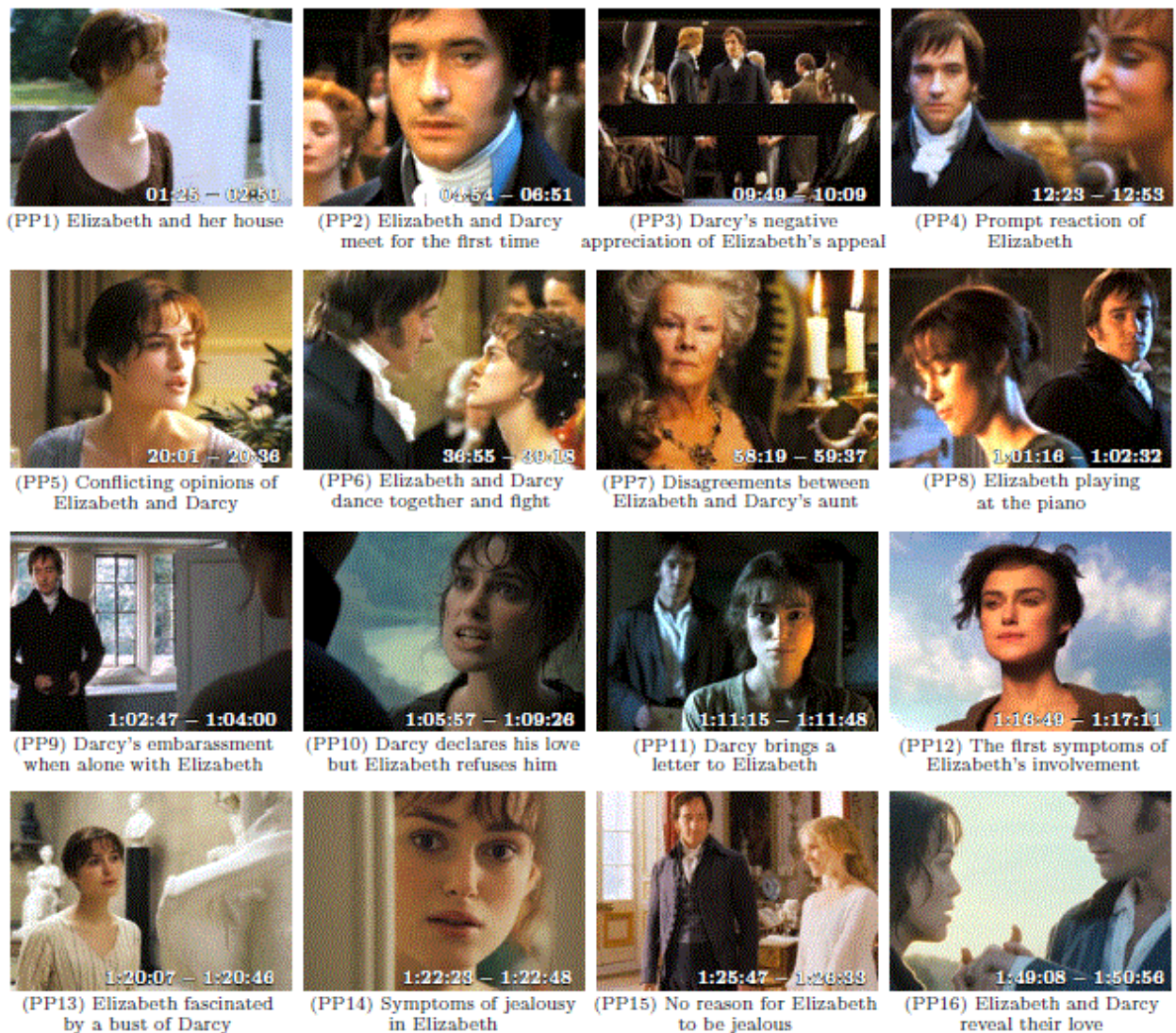


## A Mathematical Model of “Pride and Prejudice”

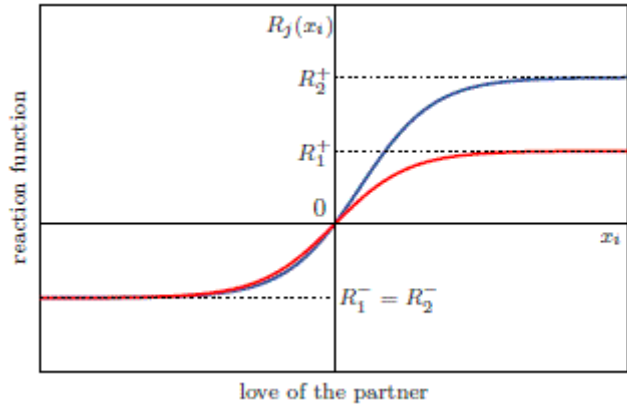
**Sergio Rinaldi**, *Politecnico di Milano, Italy, and International Institute for Applied Systems Analysis, Laxenberg, Austria*, **Fabio Della Rossa**, and **Pietro Landi**, *Politecnico di Milano, Italy*.

**Abstract:** A mathematical model is proposed for interpreting the love story between Elizabeth and Darcy portrayed by Jane Austen in the popular novel *Pride and Prejudice*. The analysis shows that the story is characterized by a sudden explosion of sentimental involvements, revealed by the existence of a saddle-node bifurcation in the model. The paper is interesting not only because it deals for the first time with catastrophic bifurcations in romantic relationships, but also because it enriches the list of examples in which love stories are described through ordinary differential equations.

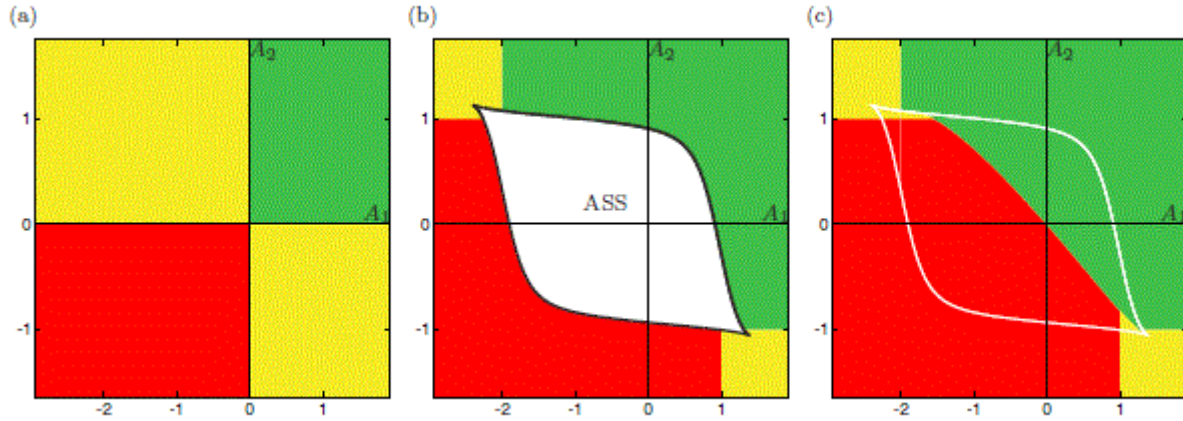
### COLOR FIGURES



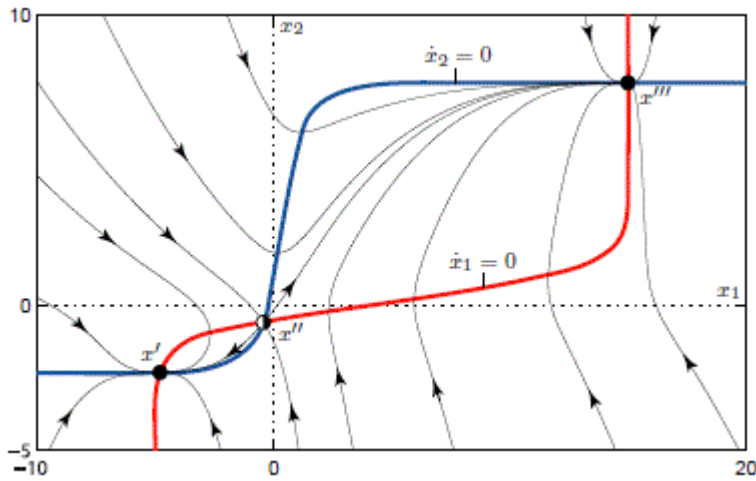
**Fig. 1.** Still frames of the 16 film segments (PP1,...,PP16) described in the text (courtesy of Universal Studios).



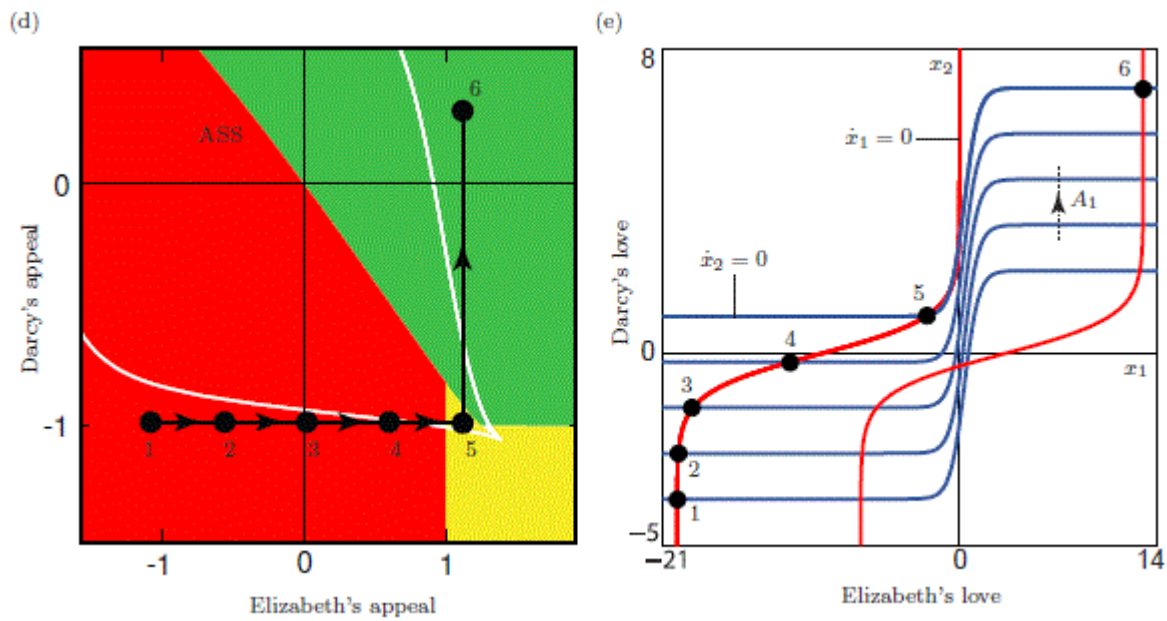
**Fig. 2.** Typical reaction functions  $R_1(x_2)$  (red) and  $R_2(x_1)$  (blue) of two secure individuals; see Rinaldi et al. (2010).



**Fig. 3.** The signs of the feelings in Eqs. 2 for all possible values of the appeals  $A_1$  and  $A_2$ . In the green [red] regions the feelings are both positive [negative], while in the yellow regions they are of opposite sign. (a) The signs of the feelings during the initial phase of the love story. (b) The signs of the feelings in the long term. (c) The signs of the feelings in the long term when the two individuals are initially indifferent one to each other.



**Fig. 4.** Null-clines and trajectories of Eqs. 2 in the space  $(x_1, x_2)$  of the feelings. Trajectories are vertical [horizontal] on the null-cline  $\dot{x}_1 = 0$  [ $\dot{x}_2 = 0$ ].



**Fig. 5.** Interpretation of the love story between Elizabeth and Darcy with Eqs. 2. (a) The evolution of the perceived appeals (point 2: PP4; point 3: PP6; point 4: PP7; point 5: PP8; point 6: PP11). (b) The null-clines  $\dot{x}_1 = 0$  and  $\dot{x}_2 = 0$  for the points 1, ..., 6 in (a).