

9th CDPS 2015 , Beijing Institute of Technology,  
Beijing, China, 29 June to 3 July , 2015

December 12, 2014

## **Boundary Port Hamiltonian systems with a moving interface : examples and properties**

B. Maschke

### **Abstract**

In this paper we shall consider a class of Distributed Parameter Systems defined as Boundary Port Hamiltonian Systems [2, 3] which spatial domain, assumed to be 1-dimensional, is splitted into subdomains separated by a moving interface. Such systems have been defined for systems of two conservation laws where it had been shown that one may define a extension of a Stokes-Dirac structure including the interface variables[1]. In this paper , we shall extend the definition to a higher number of conservation laws associated to conservative and dissipative systems and illustrate the deifinition with several examples; In a second instance, we shall analyze the passivity and system's properties of this class of system and analyze different classes of of interface relations.

### **References**

- [1] M. Diagne and B. Maschke. Port hamiltonian formulation of a system of two conservation laws with a moving interface. *European Journal of Control*, 19(6):495 – 504, 2013.
- [2] Y. Le Gorrec, H. Zwart, and B.M. Maschke. Dirac structures and boundary control systems associated with skew-symmetric differential operators. *SIAM J. of Control and Optimization*, 44(5):1864–1892, 2005.
- [3] Hans Zwart, Yann Le Gorrec, Bernhard Maschke, and Javier Villegas. Well-posedness and regularity of hyperbolic boundary control systems on a one-dimensional spatial domain . *ESAIM-Control Optimization and Calculus of Variations*, 16(4):1077–1093, Oct.Dec 2010.