PASSIVE BOUNDARY DAMPING
OF VISCOELASTIC STRUCTURES

WOLFGANG DESCH, KENNETH B. HANNSGEN AND ROBERT L. WHEELER

ABSTRACT. We consider a linear viscoelastic structure controlled and observed by finitely many collocated actuators and sensors. We discuss properties of the open loop transfer function and the corresponding impulse response. Moreover we give a decomposition formula for the solutions of the closed loop problem with passive boundary damping in terms of solutions with energy conserving boundary conditions.

1. **Introduction.** This is a technical paper on the role of damping boundary conditions for the motion of viscoelastic structures. The mechanical systems that will fit into this framework are made up of one or several viscoelastic parts and their motion satisfies the following conditions:

• The deflections are small enough to justify a linear constitutive law.

• If large rotations of the system as a whole are considered, the system obeys symmetry relations which allow the angular velocities to enter the equations linearly. (Usually violated if the center of rotation itself may move.)

• Finitely many sensors and actuators, located at the boundary, control and observe the motion of the system. Sensors and actuators are collocated.

• The mass of the sensors and actuators is small enough to be ignored.