BOPTEST Testcase 3

CONTENTS

ONE

MODEL DESCRIPTION

Testcase 3 consists of 2 independent 1R1C networks which are both controlled independently by their own P-controller by default. The separate RC networks reflect the structure of BOPTEST testcase 1. As visualized in Figure 1, the top and bottom RC networks are referred to as the North and South zones respectively.

Each zone is heated or cooled by a prescribed heat flow which is controlled with a proportional feedback controller (P-controller) that activates when the zone temperature violates the prescribed lower or upper bound. The basic P-controllers implemented in BOPTEST have a gain of 2000 and use different lower and upper bounds for each zone. The lower and upper bounds for the Northern zone are 20°C and 23°C, and those for the Southern zone 21°C and 24°C respectively.

The heating / cooling power is not generated by a dedicated heating / cooling component but obtained by dividing the signal of the P-controller by a fixed efficiency of 99% and taking the absolute value. Ambient temperature is assumed to have a prescribed sinusoidal profile and is separated by the zone with a fixed thermal resistance. The thermal resistances have a value of $0.01 K/W$ while the zonal capacitances have a value of $10^6 J/K$.
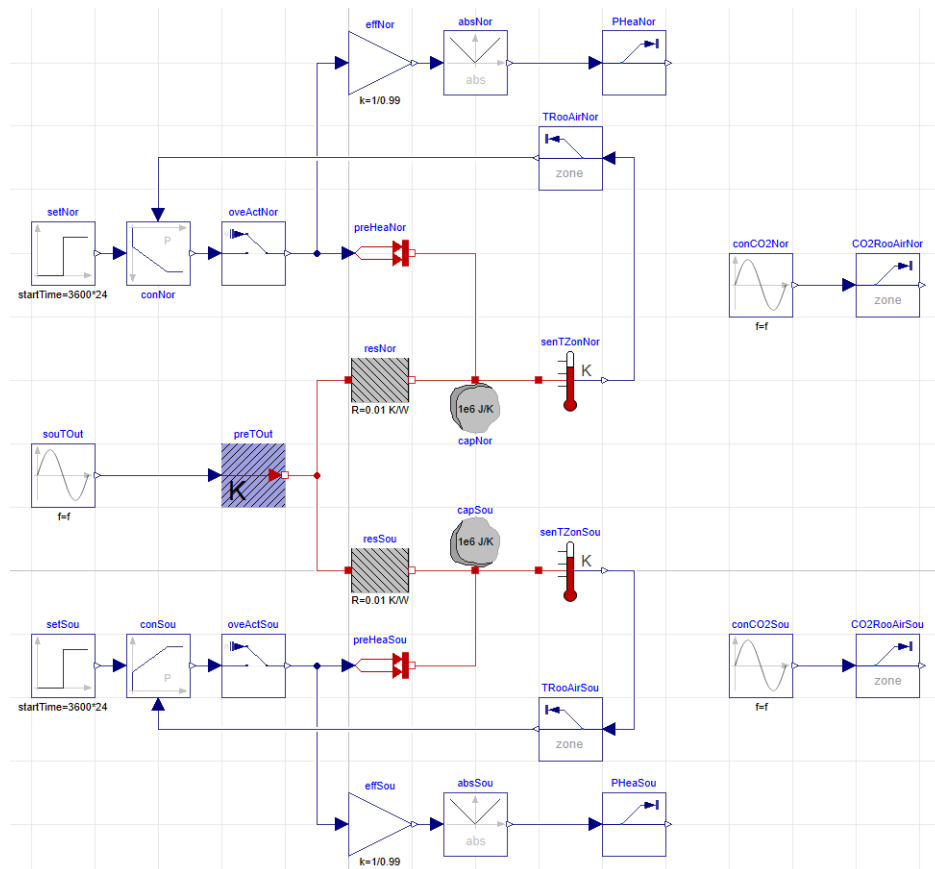
Figure 1 illustrates the testcase as implemented in Modelica.

Fig. 1: Figure 6 – Modelica implementation of the 1R1C network.