EVS35
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# New method of rapid heating battery for electric vehicles at low temperature

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## Introduction

(a) Electric vehicles (EVs) suffer from significant driving range loss at low temperature

(b) Preheating has become an essential function to improve battery performance

(c) Additional electronic components (circuits) are unavoidably, leading to the high cost and large size

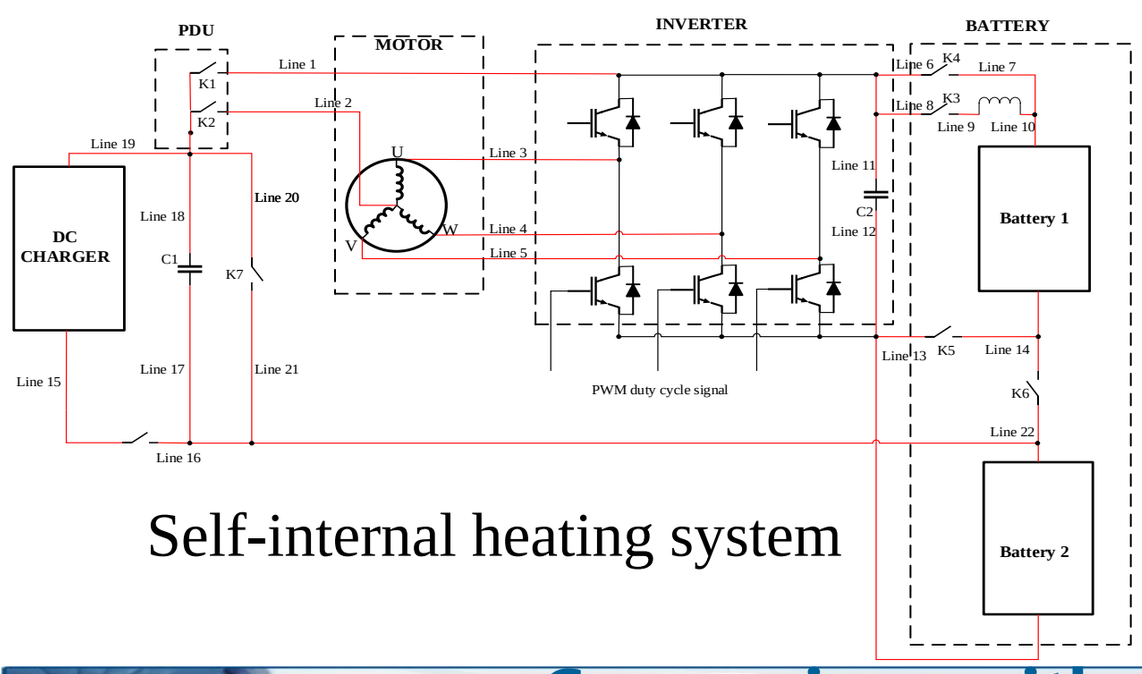
## objectives

(a) A self-internal heating system with the existing circuit of EVs has been proposed

(b) High pulse current have been achieved between the two packs

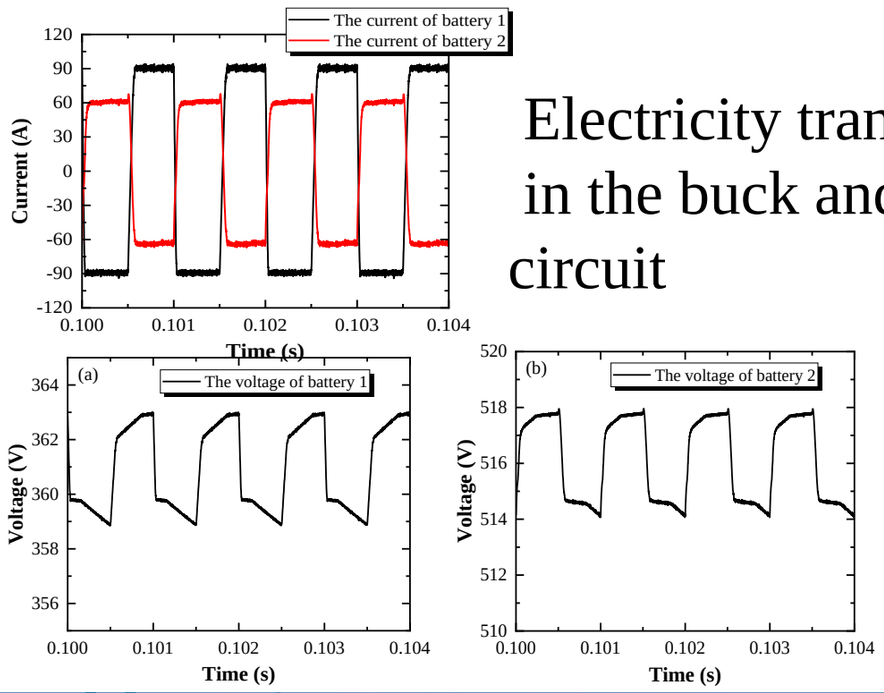
(c) The rapid, efficient, and harmless battery heating method is realized

## Methodology



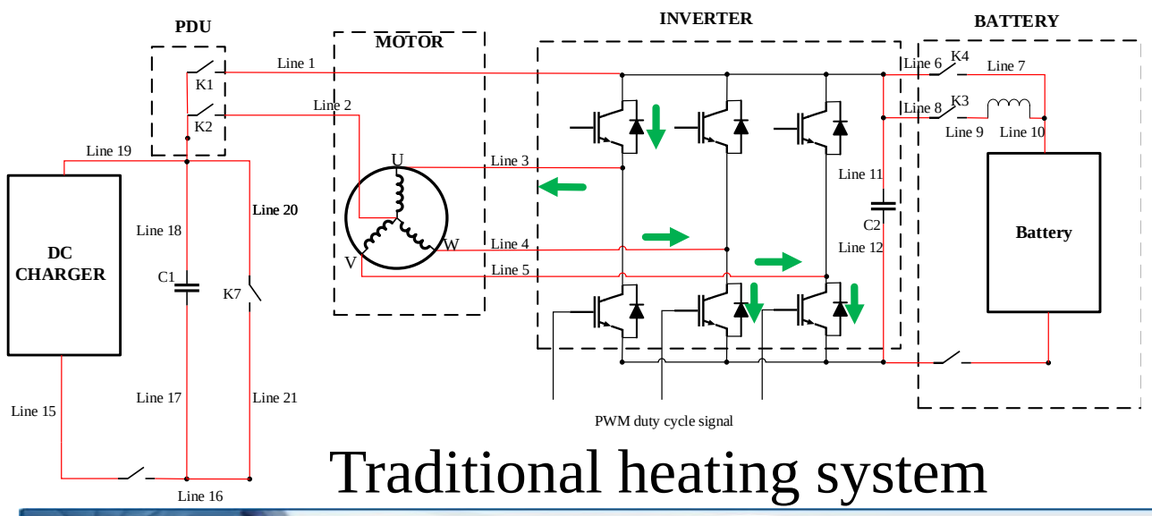

Self-internal heating system

## Circuit operation

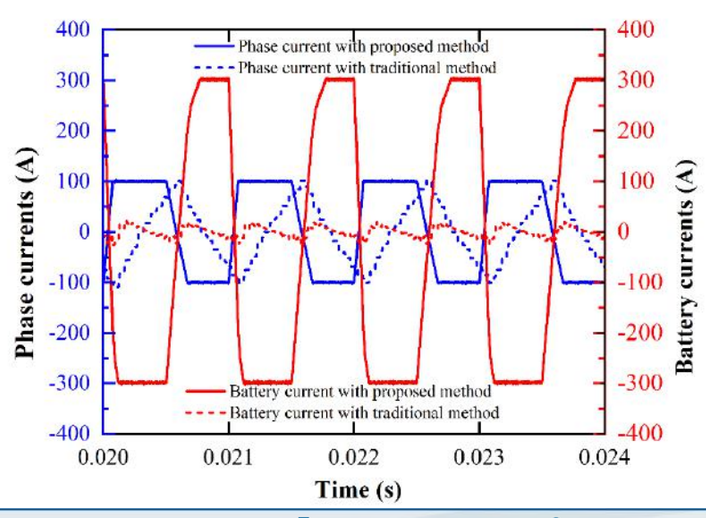



Electricity transfer in the buck and boost circuit

## Comparison with traditional heating system

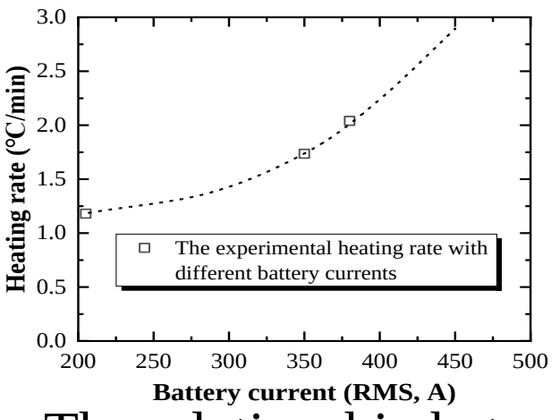



Traditional heating system

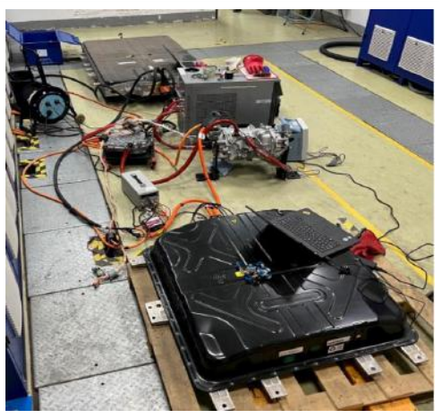



With the adaption, the buck and boost circuit realizes the high pulse current (from 0.1C to 1.5C) with 200Ah capacity

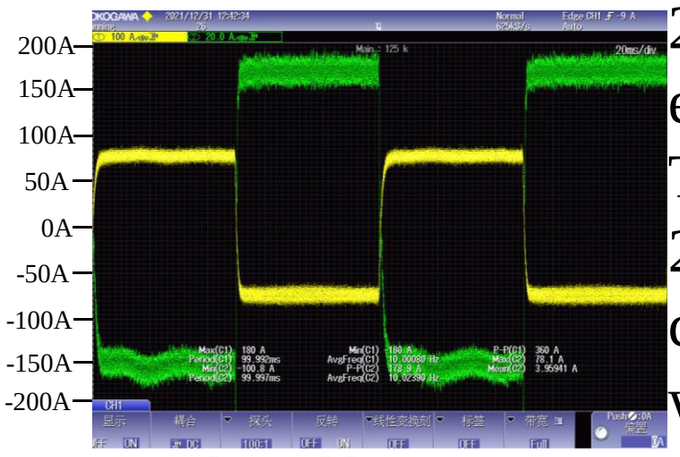
## Validation by a pre-research experiment




The relationship between battery current and heating rate



Test equipment




Buck and boost circuit

200V voltage difference exists between the batteries. The results show that about 200A of maximum battery current has been realized, which proves the feasibility of the proposed method

## Conclusions

(a) A refined circuitry topology is compatible with the existing electrical architecture

(b) A high pulse current of the batteries has been achieved, proving the rapid and battery heating method

(c) Relevant heating rate experiments with 800V system by using the proposed refine circuitry topology will be carried out in the future work