

BACKGROUND

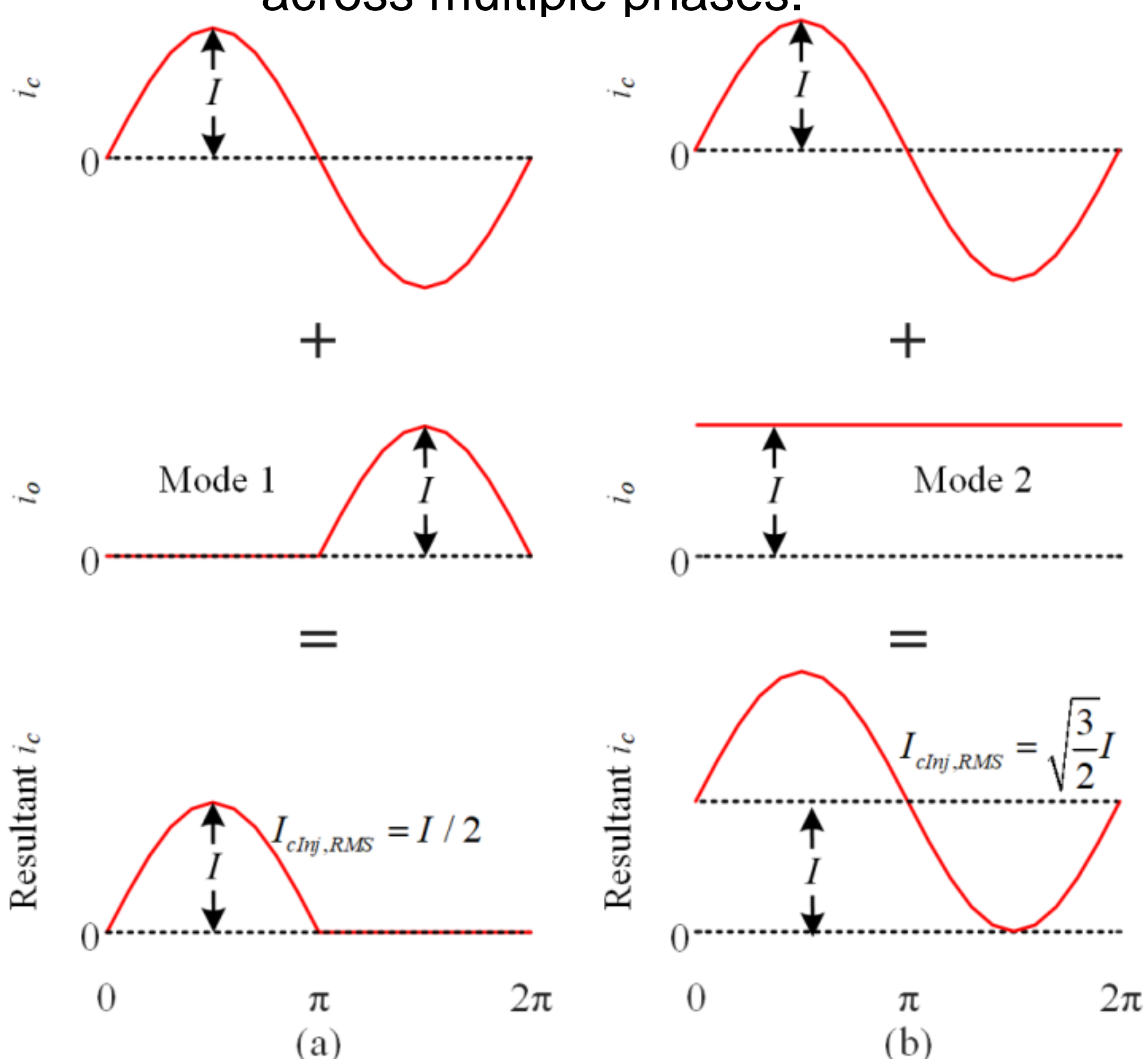
Increasing numbers of electrical machines and drives are being used in applications that require a high level of reliability and fault tolerance. In many cases, permanently reduced drive performance is still acceptable after a fault. For example, an electromechanical actuator for a control surface of an aircraft.

TECHNOLOGY DESCRIPTION

This promising technology allows open-end winding machine continuously operate under multiple open-circuit switch/diode failures in voltage source inverter.

TECHNOLOGY DETAILS

1. Injecting of zero sequence current
2. Shifting phase current direction
3. Bypassing faulty devices
 1. *Mode 1* for up to two device failures and maximising torque output under fault.
 2. *Mode 2* for up to six device failures across multiple phases.



FAULT TOLERANCE ADVANTAGES

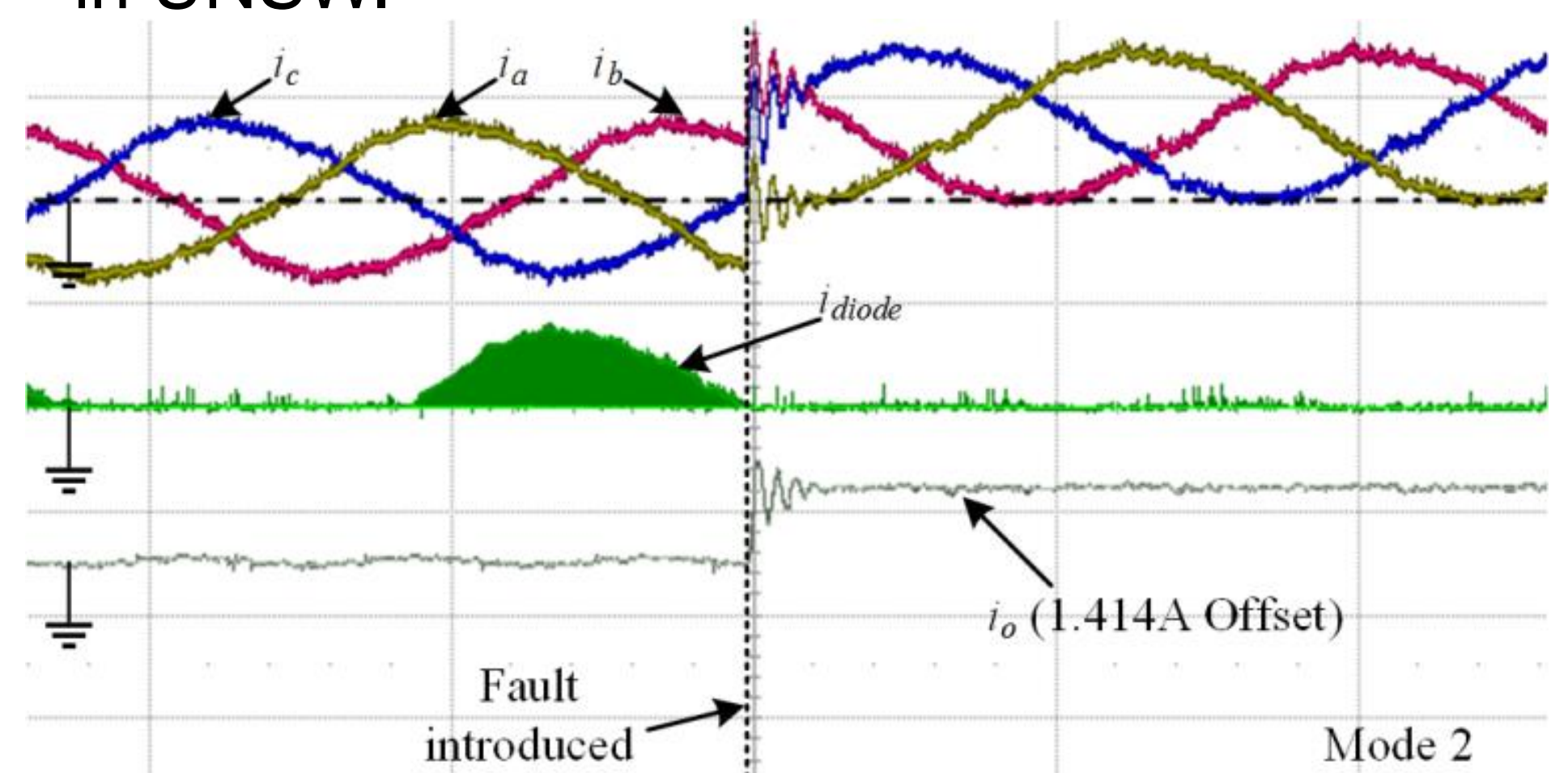
- High torque output under fault (0.72 per unit)
- Low cost compare with additional hardware approaches (cost factor 1.15 compare to 2.3)
- No extra hardware configuration

OPEN-END WINDING ADVANTAGES

- High dc bus utilisation
- Three level output – lower current harmonics
- Independent control of phase currents
- Intrinsic fault tolerance

EXPERIMENTAL TESTING

This technology has been successfully tested at Power Electronics and Drives Laboratory in UNSW.



OUR EXPERTS

Bin Zhu received B. Eng. (with first class honors) in electronics and telecommunication from The Australian National University, Canberra. He is currently with the Energy System Research Group at UNSW. His research interests include electrical machine drives and fault tolerant inverters.

John E. Fletcher (M'11–SM'13) He received the B.Eng. (with first class honors) and Ph.D. degrees in electrical and electronics engineering from Heriot-Watt University, Edinburgh, U.K. He is currently a Professor with the UNSW. Prof. Fletcher is a Chartered Engineer in the U.K. and a Fellow of the Institution of Engineering and Technology