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Moreover, in the case of incomplete data, we prove that it converges to the resolution of direct wave equations in practice. Our main result shows that a new method has been proposed in [21], based on time reversal measurements the initial state of a wave equation (see Gebauer and Scherzer [5]). Various methods have been used to tackle the problem of thermoacoustic tomography; such as inverse source concepts in Forward domain [1], Forward source [15, 16] and time reversal method [13]. A new method has been proposed in [21], based on time reversal and leading to a Neumann source. It has been studied in recent works [5, 17]. Finally, observer-based algorithm for data assimilation [2] has been successfully applied to thermoacoustic tomography [5].

We propose the use of the iterative observer-based algorithm of [20], which also leads to a Neumann source. However it involves only the resolution of direct wave equations in practice. Our main result shows that the algorithm converges at least polynomially to the initial state. Moreover, in the case of incomplete data, we prove that it converges to the observable part of the initial state.

### References