TABLE 1. DEFINITIONS OF BENCHMARK CASES

Table 1. Definitions of benchmark cases

Case	Ra_0.5	Viscosity variation	l and m for initial perturbation	Resolution
BM1A	7e3	1e0	(3,2)	32x(12×32×32)
BM1B	7e3	1e1	(3,2)	32x(12×32×32)
BM1C	7e3	2e1	(3,2)	32x(12×32×32)
BM1D	7e3	1e2	(3,2)	32x(12×32×32)
BM1E	7e3	1e3	(3,2)	32x(12×32×32)
BM1F	7e3	1e4	(3,2)	32x(12×32×32)
BM1G	7e3	1e5	(3,2)	32x(12×32×32)
BM1H	7e3	1e6	(3,2)	32x(12×32×32)
BM2A	7e3	1e0	(4,0)+(4,4)	32x(12×32×32)
BM2B	7e3	2e1	(4,0)+(4,4)	32x(12×32×32)
BM2C	7e3	3e1	(4,0)+(4,4)	32x(12×32×32)
BM2D	7e3	1e2	(4,0)+(4,4)	32x(12×32×32)
BM2E	7e3	1e3	4,0)+(4,4)	32x(12×32×32)
BM2F	7e3	1e4	(4,0)+(4,4)	32x(12×32×32)
BM2G	7e3	1e5	(4,0)+(4,4)	32x(12×32×32)
BM2H	7e3	1e6	(4,0)+(4,4)	32x(12×32×32)
BM3A	1e5	1e0	(4,0)+(4,4)	48x(12×48×48)
BM3B	1e5	1e1	from BM3A	48x(12×48×48)
BM3C	1e5	3e1	from BM3A	48x(12×48×48)
BM3D	1e5	1e2	from BM3C	48x(12×48×48)

Note:

1) Resolution in radial direction (the number outside of the parentheses) for our calculations is refined near the top and bottom boundaries.

2) Resolution for comparison cases is 48x(6×48×48) for Stemmer et al. {2006}, 102x(102×204) for Yoshida and Kageyama {2004}, where the number outside parentheses represents the resolution in radial direction.

3) Ratcliff et al {1996} used different resolution for cubic and tetrahedral symmetry cases, as they considered the symmetry of these cases and did not compute them in a full sphere. For cubic symmetry cases, the equivalent resolution is 32, 64, and 128 cells in radial, co-latitude and longitude directions, respectively, and these numbers are 32, 32, and 64 for the tetrahedral cases.